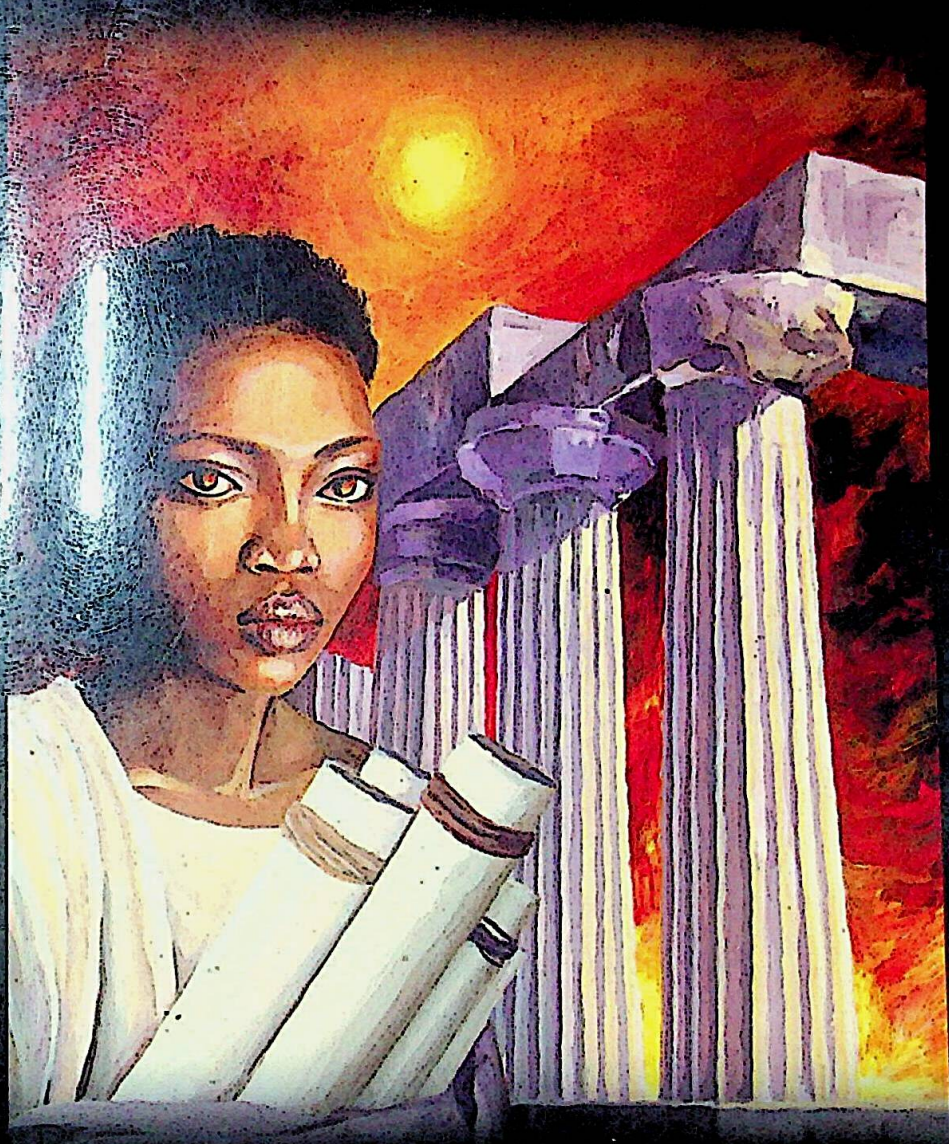


Euclid and Jesus



C. K. Raju



Multiversity



Citizens International

Euclid and Jesus

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EUCLID AND JESUS

How and why the church changed
mathematics and Christianity
across two religious wars

C. K. RAJU

MULTIVERSITY AND CITIZENS INTERNATIONAL

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The woman on the cover, with fire in her eyes, is an image of Hypatia by Lim Jee Yuan. In the background is the burning Great Library of Alexandria. Hypatia's father, Theon, was its last librarian. The book tells Hypatia's story.

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Prologue:

Who should read this book?

Euclid is celebrated as the father of geometry, and author of the *Elements*, a book once revered like the Bible, but now a school text. The story goes that he was a white-skinned man, strangely enough from Africa, who lived three centuries before Jesus.

Now, what is the *evidence* for this extraordinary story? Remarkably few seem to know. Most people hear the story of Euclid along with geometry lessons in school. And children don't ask for evidence—did you? This book gives you a second chance to ask that long-unasked question. What is the evidence for Euclid?

Strange things wriggle out the moment one digs for the evidence. Greek manuscripts of the *Elements* do *not* mention Euclid as its author. Commentaries speak anonymously of the “author of the *Elements*”. Now what was the terrible crime for which the author of the *Elements* was made anonymous? Was it just because she was a woman, Hypatia?

Why were mathematicians (or philosophers, as they were then called) so hated by church priests? Isn't mathematics universal? Today, our schools teach mathematics on that belief. But it is well known that mathematics did not develop in the same way in all cultures, so this universality is not a fact but a norm. Western scholars insist that mathematics must imitate Euclid's supposed doctrine of proof, so that traditional Indian and Chinese mathematics (which had a different notion of proof) was inferior and not quite mathematics! Now, if mathematics is universal it should have developed the same everywhere. And if that did not happen, then why should Euclid be the benchmark? Why not Āryabhaṭa or Hypatia?

Strangely, the philosophy attributed to Euclid exactly fits the church theology of reason invented during the Crusades when Europe first heard of Euclid. So the demand to imitate Euclid is also

an implicit demand to accept that church theology. That theology served (and still serves) as a key weapon against all non-Christians, especially Muslims, as this book explains. This has some unexpected consequences, even for Christians!

Were you put off by math in school? Are your children weak in it? This book explains why it wasn't your fault! Present-day math is difficult just because it got entangled with Christian metaphysics.¹ So, disengaging mathematics from theology also makes math easy. I have demonstrated this in teaching experiments in universities in three countries, by teaching calculus, with a new philosophy of math, even to non-math students, in just five days.² But, to understand all this, it is first necessary to understand how mathematics got entangled with Christian theology across two religious wars. That is what this book explains—to those ordinary people who never learnt math properly.

Now, the thought of a religious bias in present-day mathematics surprises many people. They are unaware that the very word mathematics derives from mathesis, a term imbued with deep religious meaning since Plato, and his black Egyptian sources, down to Hypatia and her successor, Proclus. Those religious beliefs were central also to original Christianity, and to the book *Elements*, as its commentator Proclus states. But few know about those beliefs today for they were cursed by the church and became taboo in the West. This book aims to explain all this to a wide audience. Every true Christian too should know about this, for it shows how the original Christian doctrine was repeatedly mangled by the church, in its quest for world power.

My own reason for writing the book is the following. I believe that education must free the mind, and not enslave it. So, I always encouraged my children to question their school texts. The need to do so became particularly acute when school texts were abruptly changed by the centre-right NDA government, after it came to power in India in 1999. They wanted to instill pride in Indian culture. Undoubtedly, there is much to be proud of in Indian culture, from which Europeans learnt both arithmetic and calculus.³ But the textbook writers did not bother to research it: for them, pride was axiomatic. This led to many factual inaccuracies, and there was an uproar over the saffronization of history in school texts. My younger son was then in class 5, and I repeatedly showed him the primary sources, to point out the errors in his school books.⁴

Later, the NDA government was replaced by the centre-right UPA government. There was no longer any question of a Hindu bias, for

the new government was led by an Italian-born Roman Catholic. The school texts were again changed. My son was now in the 9th standard. His school text in math now contained a long string of images of white-skinned Greeks, described in heroic terms as the originators of mathematics. But by now my son had cast off the spell and stopped trusting his school texts. He wryly asked: why do all Greeks look alike? (Naturally one suspected that all those images were similar just because they were based not on evidence, but only on the artists' racist imagination, which depicted a Caucasian stereotype.)

I took up the matter with the NCERT, the Indian government agency responsible for those texts, and also with the authors of the texts. I asked them what evidence they had for the existence of Euclid, or for the color of his skin, considering that Euclid was supposedly from Alexandria, in Africa. The authors produced no evidence. Nor did they modify the text, which still has a chapter on "Euclid's geometry". All they did was to replace the image of one Greek, Euclid, with a Chinese-looking one, to evade the charge of promoting racism! One of those authors now heads the NCERT.

When the school texts were first changed, it was clear to all that mixing politics with religion distorts history within a mere 5 years, and that distorted history can be a dangerous source of propaganda. But the church mixed politics with religion for the last 1700 years. It openly advocated distorted history as a weapon since its first religious war against "pagans". (This resulted in the 5th c. *History against the Pagans*, written by Orosius, which said not a single good word about any non-Christian.) History was again distorted during the second religious war—the Crusades against Muslims—by attributing all knowledge in Arabic books to early Greeks, real or imaginary. That was when Europe first heard of the book *Elements* attributed to an early Greek, Euclid.

The Inquisition amplified this distortion of history. Copernicus, for example, like so many others, was too afraid to acknowledge his "heretical" non-Christian sources in the works of Ibn Shatir and Khwaja Nasiruddin Tusi. Thus, history was Christianized, with all world-knowledge being attributed to the theologically correct. This Christianization of history was used to justify racism by philosophers like Hume, Kant and others. Racist and colonial historians built on that legacy.

Colonialism globalised Western education—which was initiated by the church during the Crusades, and remained under its control

for the next 9 centuries. Through Western education, that distorted history has acquired a canonical status today. I naively thought that those who opposed saffronization of history did so because they were secular. Hence, I imagined they would be equally sensitive to the possibility of Christianization of history, and the church-instigated violence which accompanied it.

I wrote about this in books,⁵ scholarly journals,⁶ and newspapers.⁷ I gave public lectures, and offered a large reward for evidence about Euclid.⁸ But there was no outrage this time: the Western-educated were unperturbed with false history in school texts, so long as it had a Western pedigree. They were constantly taught from childhood to rely only on Western secondary sources (as Wikipedia still teaches them), or on "primary" sources doctored by Western editors. So, questioning the West is taboo for the indoctrinated colonised mind produced by Western education. Those victims of Western superstitions should *not* read this dangerous book for it breaks that taboo, and shows that Western sources are completely unreliable even in the important case of Euclid.

While continued Western domination of education may be a fact, and it may be hard to change the indoctrination inherent in the present-day educational system, I owed it to my children to educate them about the truth. That is how this book started. Those parents who feel the same need to free their children's minds can use this book to educate their children at home.

Last but not the least, there are also those young persons whose parents tell them there is no alternative, and no way to remedy the current system. For these young people, I have only one word of advice: revolt! If someone ties you in chains, you at least have a chance to escape for you see those chains. But if your mind is captured (as it is by false history) you have little hope. Certainly, freedom will not come for free, especially when you confront an organization which has aimed to grab world power, down the centuries, by casting a spell on the young, like an evil sorcerer. But even to dream of freedom, you must first break that spell, and that is what this book will enable you to do.

Since this book was originally told to a thoughtful child, some parts are like stories to retain the child's interest. The stories are in smaller print to separate them from the fully factual presentation. Hopefully, this will help to make the book easy to read for a wide audience.

Note: The dates in this book are given using CE, meaning Christian Era (and *not* Common Era). This is intended to eliminate the ADBC Western superstition that the Christian Era begins with the birth of Jesus. That superstition arose from the demand to recite AD ("Year of our Lord") and BC ("before our saviour") just to state any date. In fact, it is well known that the zero point of the Christian calendar was fixed only in the 6th c. CE, in connection with the date of Easter, and was not earlier regarded as connected with the birth of Jesus.

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1 The Devil's Parody

Theon stopped writing and stretched his aching fingers. He could hear them crack in the surrounding silence—the library was even quieter than usual. His mind wandered to Hypatia, and the thought brought a little smile to his face. What a lovely child she was! So quick and eager to learn. The way her soul blazed through her eyes he felt sure she would excel him in learning some day.

A shadow crossed his face as he thought with some chagrin about the Christian priest who had warned him against teaching his own daughter. "Women are the source of original sin," the priest had thundered. "It says so in the Scriptures. That is why we Christians never ordain women as priests." Hardly something to be proud of, Theon had mused. A living example of a learned woman would teach those priests to better appreciate the equity and justice that alone could maintain harmony in the cosmos. Theon called out softly, but there was no response. Strange that no one was around. With a puzzled frown, he shook his head, and went back to his writing. Soon he was absorbed in his work, so deeply that he paid no attention to the faint but growing sound of a distant din.

The din did not augur well for Theon. It came from the huge crowd that had gathered some distance away. A low cheer had gone up as Theophilus emerged from the church in his black robes. Slowly a mob gathered behind him and lurched forward towards the temple and library. Armed with all sorts of implements—axes, crowbars, and torches—the mob looked ugly and menacing to those pagans who still remained to peep from cracks in the barricaded doors behind which they hid.

But an invisible hand seemed to be impeding the mob's progress. Several times Theophilus outpaced the mob, and impatiently slowed down for those behind to catch up. Sensing the undercurrent of unease, he renewed his shouts: "Alleluia", "Pax Dei", "Jesus comes: smash the false gods!".

His followers responded. But the zeal was somehow missing. The response of the mob became even more subdued as it neared the temple built on an artificial mound rising a hundred steps above the city. Fear was clearly visible on the faces of many.

On the face of it there was little reason to fear, for this was the largest mob that had ever gathered together in the Roman empire—and there was a strong rumour that even the few pagans guarding the temple had fled. But the temple was guarded by magic—the magic of childhood memories. And, at the base of the mound, the mob came fully to a halt. Theophilus well understood the reason for their reluctance—any child in Alexandria would have understood it.

Throughout the Roman empire, in the late 4th c., Christian mobs had smashed “pagan” temples, and seized their accumulated wealth. As the historian Gibbon describes it,

in almost every province of the Roman world, an army of fanatics, without authority and without discipline, invaded the peaceful inhabitants; and the ruin of the fairest structures of antiquity still displays the ravages of *those* barbarians...⁹

By the end of the 4th c. most pagan temples in the Roman empire were gone—destroyed by rampaging Christian mobs. The violence had, however, so far left untouched the temple of Serapis, one of the last remaining temples in the Roman empire. Serapis had been the presiding deity of Alexandria—better known then as the city of Serapis—for the seven centuries since Alexander’s death. But, it was for a strange reason that the temple of Serapis still continued to exist.

For Egyptians, “Serapis” or “Aser-api” was an amalgam of the traditional Egyptian deities Auser (Osiris) and Apis. But the Greeks thought of Serapis as a Greek god. Strange though it seems today, the Egyptian and Greek gods were similar because the Greek gods were copied from Egypt, as the Greek historian Herodotus points out in his *History*.

Almost all the names of the gods came into Greece from Egypt...¹⁰

Herodotus explains that Osiris of the Egyptians is the same as Bacchus of the Greeks.¹¹

Egyptians do not all worship the same gods, excepting Isis and Osiris, the latter of whom they say is the Grecian Bacchus.

Bacchus was also known as Dionysus. The learned Roman philosopher Porphyry explains that "Dionysus among Greeks [is] the same as... Osiris among Egyptians".¹² Several Roman emperors worshipped Serapis whose images appear also on Roman coins.¹³

Although the worship of Bacchus began long before the advent of Christianity, Dionysus or Bacchus is strikingly similar to Jesus.¹⁴ Bacchus was born of a virgin mother on 25 December. The significance of the date is that it comes exactly nine months after the date of the equinox, then taken as 25 March—a day dedicated to the enjoyable worship of Bacchus—for the equinox then marked the start of the new year. The new year was special to Bacchus, for it signified the process of creative renewal of the world as reflected in the annual cycle of seasons. The beginning of the new year was celebrated with revelry—a tradition which continues to be observed to this day.

This god Serapis/Bacchus was, like Jesus, the god of love, and this was depicted by the symbol of Bacchus: the cross. The cross signified creativity—the renewal of the cosmos with each cycle. An amulet from the 3rd c. shows Bacchus against the cross in a characteristic pose today associated with Jesus—although those images of Jesus come from several centuries later. The love of which Bacchus was the deity was a natural sort of love, so that his cross would today be termed a fertility symbol or a phallic symbol.¹⁵

The love that Serapis signified was love that did not admit hatred of anyone. The followers of Serapis thought all people to be equal, and they extended their love even to those who did not believe in Serapis. And, unlike the crown of thorns in the typical image of Jesus from the 10th c. onwards, Serapis "was distinguished... by the basket, or bushel, which was placed on his head".¹⁶ The love of Bacchus related to creativity, and the bushel represented the creative outcome of the efforts of the peasant.

At that time Christianity was still a simple doctrine of love. So, it is not surprising that Christians, too, initially worshipped Serapis because of his manifest resemblance to Jesus.

[In] the land of Egypt... those who worship Serapis are, in fact, Christians, and those who call themselves bishops of



Figure 1.1: An amulet from the 3rd c. shows Bacchus against the cross in a characteristic pose that is associated today with images of Jesus Christ, which images come from several centuries later. Source: T. Freke and P. Gandy, *The Jesus Mysteries: Was the "Original Jesus" a Pagan God?*, Three Rivers Press, New York, 1999.

Christ are, in fact, devotees of Serapis. . . Even the Patriarch himself, when he comes to Egypt, . . . worship[s] Serapis.¹⁷

Initially, Christian priests had acknowledged the similarity of Bacchus and Jesus, and even used it to persuade Gentiles to convert to Christianity as a kindred religion.

And when we say. . . the first-birth of God. . . was produced without sexual union, and that He, Jesus Christ, . . . was crucified and died, and rose again, and ascended into heaven, we propound nothing different from what you believe regarding. . . Bacchus.¹⁸

Even the rituals were similar. The followers of Serapis sprinkled water on a new initiate as in the Christian ritual of baptism, and ate bread and drank wine as in the Christian ritual of communion (Eucharist).



Figure 1.2: An image of the god Serapis, recovered from Alexandria

This strategy of stressing the similarity of Jesus (Isa, Iesu) and Bacchus (Osiris, Ausar) boomeranged, for people naturally preferred the original to what they regarded as an inferior copy. Therefore, the priests later started telling a different tale. Indeed, driven to desperation by this similarity, a Christian priest had called in the devil to his assistance:

For when they tell that Bacchus... was the discoverer of the vine;... and when they introduce wine into his mysteries, do I not perceive that [the devil] has imitated the prophecy announced by the patriarch Jacob, and recorded by Moses?¹⁹

Since this claim of the devil's parody or "plagiarism in anticipation" lacked credibility, another priest, Tertullian, gave an even simpler explanation by distorting history. Though Egypt preceded Christianity by several thousand years, he just lied that Christianity came earlier.

Whence is it... you have all this, so like us, in the poets and philosophers? The reason simply is, that they have been

taken from our religion. But...our sacred things...being of earlier date...are the truer.²⁰

Anyway, it was because of these close similarities between Serapis and Jesus that the temple of Serapis still existed. Understandably, many in that mob were uneasy. The mob however was led by Theophilus, the bishop of Alexandria.

The historian Gibbon described Theophilus as "the perpetual enemy of peace and virtue, a bold, bad man, whose hands were alternately polluted with gold, and with blood".²¹ Even the *Catholic Encyclopaedia* concedes that Theophilus was "extremely violent and unscrupulous in the choice of his means".²² Knowing the amount of gold in the temple, Theophilus was not going to be deterred so easily.

Theophilus had been planning the destruction of this temple for the last six years—ever since he became the Patriarch of Alexandria. Bound by an oath of loyalty to the Roman emperor, he had written to the emperor several times, urging him to grant permission to destroy all pagan temples in Alexandria, and to erect churches in their place. This would be a service to God, he had argued. Though the emperor was a Christian, and Christianity had been the official religion of the Roman empire these last sixty years, it was not easy for the emperor to concede this demand, for the Roman empire had had a long tradition of religious tolerance: people had to be loyal to the king, but they were free to worship any god they wanted. Serapis, who resembled Jesus, was an especially difficult case for the emperor to decide.

But Theophilus was not one to wait idly for the emperor's permission. He had prepared his flock by feeding them daily doses of poison with concocted stories of how pagans had ill-treated Christians in the Roman empire. With every passing year, the volume of Christian martyrs grew in number. His listeners did not demand proof, for they had faith in him. They believed those stories²³—as so many do to this day.

It is not hard to reconstruct what happened. In his sermons, Theophilus dwelt on the wicked ways of the pagans, the idols they worshipped, and the evil books they wrote. He thundered about sin and the fires of hell which awaited the pagans. And he did not forget to remind his listeners that this applied even to those who did not hate the sinners enough. When he judged that his flock was itching for a piece of action, he led them in a swift sortie against a small shrine. He destroyed it and desecrated the idol. He rejoiced when some pagans reacted violently to avenge the insult to their gods. The

bloodshed led to more bitterness. Building on it, he had led soldiers and armed servants to attack another temple, and then another. . . .

Eventually, Theophilus decided he had waited long enough for the emperor's permission. He told his close aides one must render unto Caesar what is Caesar's and to God what is God's. Publicly, he waved a papyrus before his illiterate audience claiming that the emperor had consented—nay, demanded—that the temple of Serapis be destroyed. Theophilus read out what the emperor had supposedly said, "I give you, therefore, for all time, the keys of the temples from the land of Alexandria to that of Assuan, in order that you may take from them any wealth which you will find in them and spend it in the erection of churches and monasteries, in the duration of my reign."²⁴

And so he had assembled the largest mob so far.

But this crowd was now stalled at the foot of the temple, frightened by childhood memories which bracketed Serapis with Jesus. It was Theophilus' business to understand the inhibitions and fears of his flock. At the foot of the temple, he gave an inspiring little sermon to dispel the unease among his followers. "It is all the Devil's handiwork," he shouted. "The Devil knew that our Lord was to come on earth. So the Devil came in advance to spread the story of Bacchus among the pagans, so that the true followers of our Lord would be tortured by doubts. O ye of little faith, it is a test of your faith. God is watching. We worship none other than our Lord, and it is blasphemy to allow others to worship the idols of false gods."

Then he cannily reminded people that part of the fabled wealth of Alexander was still inside the temple, and that he had seen it with his own eyes.

"I walked with him [Caesar], along with the notables of the city and all the priests, until we reached the temple of the Camp of Alexander in which (the Macedonian) had stored treasures, and the door of which he had locked and sealed. We found the door sealed with three seals so that no one should be able to open it. It had never been opened from the day of Alexander down to this day. And God opened the eyes of my mind, and I saw on the three doors three thetas inscribed on them. The first of these three letters referred to Theos which means God, the second to Theodosius, the believing Emperor, and the third to my name Theophilus. I did not know this with my own earthly knowledge nor by my own power, but by the power of God who opened the eyes of the heart of the divine Theophilus. In that hour the door, at the inner side of which was the great wealth, was thrown open, and the Emperor saw it and was amazed at the quantity of it."

Then Theophilus turned, and, brandishing the large cross he was carrying, he firmly started mounting the one hundred steps. As his followers joined him with renewed zeal, at the thought of the great wealth that they were about to obtain, a great roar of approval went up.

A mile away, Hypatia's heart sank as she heard that distant roar. She was too late! Already breathing hard, she tried to run a little faster. Though she was so young, not one man in the entire city of Serapis could run faster. In her moments of weakness, she had prided herself on being a swift mind in a swift body.

But just now there was no room for such vain thoughts in her mind which was overflowing with concern for Theon. Shocked to hear that the temple had been abandoned, she had asked in vain about her father. She had guessed what must have happened. Though she had long ago learnt to keep her mind calm, she could not help wondering impatiently why she could not run much faster—for the temple seemed farther than usual. She knew a shortcut which was rarely used because it had so many thorny bushes.

Her mind ran ahead to Theon—in their hurry to leave no one had noticed frail old Theon working away in a secluded nook of the huge library. *She* knew exactly where. Lost to the world around him, lost to the looming danger, he must have remained immersed in that book on mathematics he was completing, uncaring about his creaky fingers, and the way they swelled up.

How she enjoyed learning mathematics from him! She remembered the smile on his face as he told her gravely that though she was a lovely child it was learning that brought out the beauty of the soul. He had patted her for being the one among all his students who was the quickest to learn. And he had wondered whether perhaps one day she would be more learned than he was. The thought made her smile.

She bounded up the little-used path, uncaring about a thorn that scratched her side. But the crowd had already reached the temple! Then she sighted Theon at the elevated entrance of the temple, and heaved a sigh of relief. How calmly he faced the crowd. As he spoke, Theon gestured with his hands which held a scroll—for these last two years he had been constantly working on this book which he thought would greatly improve the world.

Theon seemed to be reasoning with the crowd—how often he had taught her the power of divine reason, which could tame even wild animals. Twice earlier she had seen Theon arguing with the Christian priest. Each time, the Christian priest had no answer and had slunk away.

She was too far from the scene to make out what Theon was saying, but she could well imagine it. "All are welcome to worship in the temple of Serapis: the rich and the poor, the strong and the weak, the lame and the blind. But before you ask something of Serapis, we ask something of you—that you don't regard yourself as superior to others." Theon turned and pointed with the scroll to the inscription on the temple: "Let no one enter who does not believe in equity and justice".

Then she saw with horror someone push him: he fell, and the scroll dropped out of his hands. Someone threw a torch in a great blazing arc towards the library. Her knees wobbled, and she closed her eyes.

The mob spilled into the precincts of the temple. Pushing aside the old philosopher was but a moment's job. But it was different with Serapis—the god of love who so resembled Jesus. Pagans they could fight, but gods were powerful.

For common people, religion is often a matter of belief in the *power* of the god they worship. Even after converting to Christianity, many people remained unsure of the power of the Christian God—they continued to fear the power of Serapis who symbolized the primal creativity which separated order from chaos. So, it was said that the end of Serapis (meaning the end of creativity) would mark the return of heaven and earth to primordial chaos. To symbolize this, the statue of the deity stretched from wall to wall, as if separating heaven from merging into earth in primordial chaos.

However, the Christians of Alexandria were mostly illiterate soldiers—"utterly unlearned" in the words of Porphyry. They did not think of the statue of Serapis as a book written in stone. Instead, there were many in that Christian mob who interpreted literally what they had heard about Serapis, just as they believed literally in the fires of hell. They were seized by the superstitious terror that destroying the statue of Serapis would cause the heavens to come crashing down in an apocalypse that would destroy the world.

So it was that at the entrance to the sanctum, the mob again stood irresolute and paralysed by fear in front of the giant statue of Serapis. A man rushed forward to implore Theophilus. "Let Serapis be. He has protected us in the past." Theophilus snorted contemptuously. Having learnt the technique of controlling his flock using superstitions, he himself was not superstitious. *He* had heard from the Roman philosophers the real history of Serapis. But few others knew of the strange logic which had tied Serapis to Alexandria.

Alexander had entered Egypt without a blow. The Egyptians had welcomed the Greeks as friends who had the same objective of overthrowing Persian rule. At the frontier of Egypt was Pelusium, the "city of mud and silt", which had a splendid natural defence, being surrounded by two branches of the Nile. But with the popular opinion so strong in favour of Alexander, its Persian governor, Mazaces, had walked out of the city walls to meet Alexander, and hand over to him the keys of the treasury.

Alexander, in turn, had shown his respect for Egyptian customs. Unlike the earlier Persian rulers, he had worshipped the Egyptian god Amun and the bull Apis. With the blessings of Egyptian priests he had moved on to capture Persia almost without a blow. But when his hordes were stalemated for months at the Jhelum river by a petty Indian king, and his army mutinied after its first real battle, he had returned to Egypt to found Alexandria from where he dreamt of launching vast attacks by the sea-route.

But Alexander's dreams were soon shattered. After his sudden death, his army splintered. His general Ptolemy could seize control of only a small fraction. With barely 4000 people, Ptolemy could hardly hope to rule Egypt without Egyptian support. So, he followed in Alexander's footsteps, and vowed to respect Egyptian customs. As a mark of this respect, Ptolemy had ruled as a mere satrap, while he consolidated his support among Egyptians.

After twenty long years as a satrap, Ptolemy had garnered enough support from the Egyptian priests to take on the title of Pharaoh, or king. Ptolemy had marked his coronation by setting up the temple of Serapis as a dazzling memorial to the abiding bonds between Greeks and Egyptians. The walls of the sanctum were lined with gold overlaid by a layer of silver, and another of bronze. Even seven centuries later, the temple continued to be regarded as the most magnificent temple in the whole world.

But Ptolemy did not want to be seen to be bending too far to please the Egyptians, for that might annoy the Greeks in his own army. And no ruler wants discontent in his army, which all too often leads to a revolt in which the leader is quickly deposed.

So, when the temple of Serapis was consecrated, Ptolemy took care to call *two* religious experts, the Greek hierophant Eumolpidae and the Egyptian priest Manetho. While one interpreted Serapis according to Egyptian traditions, the other interpreted the same

image according to Greek traditions. Thus Serapis came to be revered by both Egyptians and Greeks.

For Egyptians, "Serapis" or "Aser-api" was an amalgam of the traditional Egyptian deities Osiris and Apis. But the Greeks thought of Serapis as a Greek god. It was this joint reverence that had made Serapis such a popular god, and hence so powerful in the popular imagination. And now the Christians too revered Serapis as Jesus.

Theophilus knew that old king Ptolemy had set up the temple of Serapis to ensure smooth dealing with the Egyptians. And what a king had set up, he, Theophilus, could always break; he had no superstitious terror on that score. He resented the books of the philosophers whether on papyrus or stone: the former made it impossible to argue with the philosophers while the idols attracted all people. What did it matter, this similarity of Serapis and Jesus? After all, the pagan priests did not share their revenues with him. On the contrary, all the votive offerings that Christians made to Serapis were so much revenue lost.

However, Theophilus was too crafty to share the true history of Serapis with his flock. To be sure he might derive some advantage by pointing out that Serapis was a god made by man. But he was afraid some philosopher might turn around and publicly ask him whether Jesus too was not made by man. What Theophilus wanted was to demonstrate the greater power of his god, so he was content to let people believe in the power of Serapis. But he must show them that his own power was greater.

So, Theophilus had prepared carefully for this moment, as the mob again stood irresolute, at the entrance to the sanctum, paralysed by fear in front of the giant statue of Serapis. From the earlier experience of another Christian mob with the temple of Jupiter he knew the physical difficulty in breaking down a solidly constructed temple. His preparations had ensured an adequate supply of both weapons and wine.

Egged on by Theophilus, a drunk Roman soldier jumped on the idol. In an advanced state of inebriation the soldier hardly knew what he was doing; having been blessed by the bishop for this task, he struck a blow on the cheek of the statue with his axe. A wave of terror swept the mob. But the heavens did not fall. Greedy for the fabled wealth of which he had been promised a share, the soldier struck another blow, and yet another. Now the tide turned; with each chip of Serapis a bit of their fear went away. Soon the emboldened mob rushed at the idol, breaking it to pieces.



Figure 1.3: A 5th century CE scroll depicting the destruction of the Temple of Serapis by Theophilus.

Theophilus had also prepared for this outcome with care, and had instructed his men well. "A great number of plates of different metals, artificially joined together composed the majestic figure of the deity."²⁵

the zeal or avarice of the archbishop might have been satiated with the rich spoils which were the reward of his victory. While the images and vases of gold and silver were carefully melted. . . those of less valuable metal were contemptuously cast into the street.²⁶

All that remained of the magnificent temple of Serapis was the floor—the stones used for it were too heavy to carry away.

For these great tasks of spreading Christianity by smashing pagan deities, the church later declared Theophilus a saint,²⁷ a perfect example of how to spread the doctrine of love!

This event continues to be celebrated today by *Encyclopaedia Britannica* as a great triumph: "The destruction of the Sarapeum at Alexandria by the patriarch Theophilus and his followers in AD 391

signalled the final triumph of Christianity not only in Egypt but throughout the Roman Empire."²⁸

2 Euclid: Myth or History?

In the placid campus of the Indian Institute of Science in Bangalore, an international seminar²⁹ was on, in December 2000.

As I rose to speak, I recalled what I had said a couple of years earlier, at another international seminar in Mumbai. I had argued then that Euclid was perhaps a myth—connected to the vicious religious war in Alexandria in the 4th c. of the Christian Era—and that this myth had had an unhealthy effect on the teaching of geometry in our schools.³⁰ There had been no heated discussion then, nor even any objection to what I said—perhaps the point went unnoticed.

In this seminar, my talk was on a different topic, but the projection system failed, so I had a couple of minutes while it was fixed. I mentioned in passing the case of “Euclid” to illustrate what was wrong with the Western history of science.

Euclid is famous today as the author of the *Elements*. If there really was such a Euclid, then one would expect to find a manuscript of the *Elements* with his name in it. Strangely, his name does *not* appear in Greek manuscripts of the *Elements*. Instead, all except one of the Greek manuscripts of the *Elements* mention only Theon.

As Thomas Heath, regarded as a key authority on Euclid, explains:³¹

All our Greek texts of the *Elements* up to a century ago... purport in their titles to be either “from the edition of Theon”... or “from the lectures of Theon”.

Now Theon was the last librarian of the Great Library of Alexandria. In Egypt as in India, libraries were located within the precincts of temples, and the Great Library was tied to the temple of Serapis. We know that the temple of Serapis was destroyed at the end of the 4th c. by a rampaging Christian mob led by Bishop Theophilus. So,

the Greek manuscripts tell us that the *Elements* was *not* written at the supposed time of Euclid (–325 CE) but some 700 years later (around the end of the 4th c. CE) by Theon, or shortly afterward, at the beginning of the 5th c., by someone who came right after Theon, and attended his lectures.

As Heath further explains,³² Euclid's name does *not* appear even in Greek commentaries on the *Elements* because the Greek commentaries “commonly speak of the writer of the *Elements* instead of using his name”.

Why did the commentators speak anonymously of “the author of the *Elements*”? Why didn't they mention the author's name? Greek commentators on the *Elements* mention a whole host of names. So, what was there to hide in this case? Books relate to the social context and the prevailing context then was the religious war which Christians waged against “pagans”. Was the anonymous author of the *Elements* an object of Christian hatred? Was it because the mysterious author was a “she”, and using *her* name would give that away? Was it Hypatia, Theon's daughter, who had become such an object of wrath for the “saints” of the church?

And why did Western historians never take up these questions? My pursuit of this question had led me to Martin Bernal's *Black Athena* and to George James' *Stolen Legacy*. They made the point that racist historians distorted history³³ to belittle the ancient Egyptians who were black (see the features of the sphinx below), and glorify white-skinned people. They did this by attributing Egyptian ideas wholesale to Greeks.

Historians today tell us that Euclid, too, was from Alexandria, in Africa. They do not tell us why we must suppose he was white-skinned as his pictures show him to be. While investigating the color of Euclid's skin, I soon realized that the evidence for Euclid himself is very thin. In fact, the name Euclid somehow got linked to the Latin manuscripts of the *Elements* which started off as translations from Arabic texts during another religious war—the Crusades in the 12th c. Could it be, I wondered, that this distortion of history began during the Crusades?

At this time, I had very strong doubts, but had not reached a firm conclusion. But seminars are meant for airing and discussing such doubts. So, at this seminar, I presented the thesis that “Euclid” was an example of fraud in Western history.

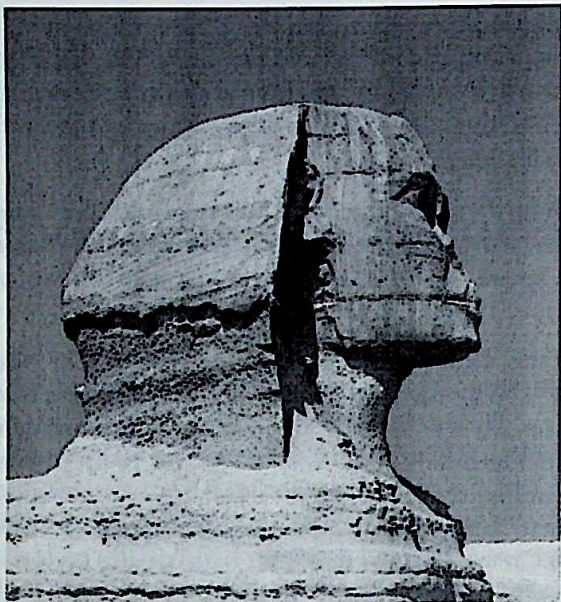


Figure 2.1: The Sphinx. A Frenchman wrote in 1785 that the head of the Sphinx “is typically Negro in all its features” and recalled Herodotus’ remark that “Egyptians are black with woolly hair”.

2.1 He who knows not...

Now, this seminar had a number of learned participants, but it also had an odd visitor, a not-so-learned newspaper reporter and political commentator from a neighbouring country. Like so many others, he was taught in middle school that Euclid was the father of geometry. Like so many others, he implicitly believed in what he was taught as a child, and never thought of questioning it. He grew up into an adult who thought there was something terribly wrong in questioning what he had never questioned all his life. So, he was outraged by what I said, and took it as a symptom of the prevailing political malaise in India—he took me to be a Hindu nationalist out to distort history. The reporter did not bother to check what religion, if any, I actually professed. Nor did he stop to think of the possibility that Christians, too, might have distorted history, especially during their religious wars.

So, writing in *Nepali Times*, he summarised the unreasonableness of the whole seminar in a single line:

There was one Prof CK Raju who said... that Euclid was a manufactured personality...³⁴

The reporter went on to accuse me of being unconcerned with the evidence: "for people like Raju," he wrote, "the evidence does not matter".

The demand for evidence is a sensible one. But, what exactly is the evidence for "Euclid"? People rarely know the evidence for the stories they heard in their childhood. Children believe what they are told—they ask for evidence only when the story changes.

The reporter had explained to me his method of checking out the evidence; he already did what many people today would do: he cross-checked about Euclid with Google.

Ask Google about Euclid, and you get over 8 million results. That seems quite reassuring. A story repeated 8 million times on the net is evidence, isn't it? An excellent proof by numbers: "So many people believe this, they can't all be wrong, can they?"³⁵

Anyway journalists, these days, are often interested only in a good story which would *sell* with their readers; truth or evidence have become secondary concerns. However, one could be charitable and say this reporter knew not that he knew not, for he probably did not know about the missing evidence for Euclid, which is not mentioned on the Internet: namely that it is Theon, not Euclid, whose name is mentioned in Greek manuscripts of the *Elements*.

2.2 He who knows he knows not...

Anyway, unlike the reporter, only the evidence matters to me, and not the number of people who believe the story. So, I again raised the same point about Euclid, another couple of years later. This was in a discussion in a mailing list on the history of mathematics.

One of the discussants, an Austrian mathematician called Peter Flor, again found my scepticism objectionable, for he too had been brought up on stories of Euclid. However, being an academic, rather than a reporter, he suddenly realized he did not know exactly what the evidence was for Euclid. One might say that he "knew that he knew not". But the stories he had heard gave him confidence that the evidence was there, known to knowledgeable historians. So, he asked the authorities to step in:

C.K. Raju states that historical evidence on Euclid is very meagre, and that much has been ascribed to him with insufficient reason. Could one of the historians on this group kindly indicate where one may learn what is known...?³⁶

2.3 He who knows he knows

The late David Fowler was widely recognized as a leading authority on Greek history. He “knew and knew that he knew”, and he answered as follows.

Dear Peter Flor

<<What is known at present 1. about the person “Euclid”>>

Nothing

<<2. and more importantly, on the origin of the texts of which he is (or was) supposed to be the author? >>

Almost all of our texts come from Constantinople, the earliest from 888 AD, closer [in] time to us than to the supposed date of Euclid!

Best wishes,

David Fowler³⁷

Strange, isn't it? Here is a name, “Euclid”, familiar to every child who is schooled, and grows up convinced that the name corresponds to a real historical person, and that any thought to the contrary is outrageous. He is happily shown pictures of white-skinned men which purport to be images of “Euclid”. The story has been told for centuries, and is retold 8 million times on the web. Yet, leading scholars say that NOTHING is known about the person “Euclid”!

2.4 How myth differs from history

So is this “Euclid” myth or history? The difference is this: a myth is a web of stories—each story, like a strand in a spider web, is supported mostly by another story, which is supported by yet another story, and so on. The stories are sticky—they stick to the human mind, which gets entrapped in myth like a fly gets trapped in a spider web. The young minds of children are especially susceptible to such traps. History, however, requires hard evidence to support each story. “Euclid” as

myth is supported by a story repeated 8 million times on the web, but what is the hard evidence?

Let us examine matters more closely, to judge for ourselves whether "Euclid" is myth or history. First the stock story, then the facts.

3 Euclid: The Story

3.1 The greatest mathematician

Who was Euclid? The greatest mathematician of antiquity, perhaps the greatest mathematician of all time—that, anyway, is what the stories about him say.

Here are some quotes from the first few entries returned in a Google search relating to Euclid the mathematician.

Euclid... is the most prominent mathematician of antiquity best known for his treatise on mathematics *The Elements*. The long lasting nature of *The Elements* must make Euclid the leading mathematics teacher of all time.³⁸

So there we are! Who was Euclid? Perhaps the greatest mathematics teacher of all time. Why? For the book that he wrote lasted so long. Similarly, we hear:

Euclid's *Elements* form one of the most beautiful and influential works of science in the history of humankind. Its beauty lies in its logical development of geometry and other branches of mathematics. It has influenced all branches of science but none so much as mathematics and the exact sciences. The *Elements* have been studied 24 centuries in many languages starting, of course, in the original Greek, then in Arabic, Latin, and many modern languages.³⁹

Of course, this passage is about the *Elements* and how it has been such an influential book for so long. There is no doubt at all about that. The passage, however, doesn't tell us who the author was, simply

taking for granted that it was Euclid, and that the original was, “of course”, in Greek.

Or again,

Up until the middle of the nineteenth century, Euclid’s *Elements* ranked second only to the Bible as the most widely-printed and widely-read book in the world: they served as the standard mathematics textbook for over two thousand years.⁴⁰

This passage again tells us how influential a book the *Elements* has been—“second only to the Bible”. The author of such a book doubtless is a major historical figure.

But, what exactly do we know about the author of the *Elements*? Even those who tell these grand stories admit that nothing much is known about Euclid.

However, little is known of Euclid’s life except that he taught at Alexandria in Egypt.⁴¹

Nevertheless, the MacTutor website on the history of mathematics, for example, provides almost exact dates for “Euclid”.

Euclid... born about 325 BC, died about 265 BC in Alexandria, Egypt.

The “about” followed by exact years suggests an uncertainty of at most about a year or two. That is an impressive level of precision for something that happened so long ago, though the website does not tell us the exact source of this precision.

3.2 The Greek race

Since the story of this Euclid is so thin, there is a natural tendency to fill it out. However, adding imagined details could also be a systematic process. Euclid’s Greek origin, in the sense that he was part of the Greek *race*, is today a key part of the story.

Some Arab authors, however, tell a different story about Euclid. They say that Euclid, although a Greek national, was from Tyre and that he lived in Damascus. Tyre was a town in Lebanon, which fell to Alexander in 332, and Alexander made some 30,000 slaves at Tyre

according to the *Encyclopaedia Britannica*. So, if this story is true, then Euclid, though a Greek by nationality, could well have been of Arabic origin, and a refugee or a slave.

Though little is known about Euclid, the suggestion that Euclid was of non-Greek origin is vehemently rejected by Western historians. The reason is that the story about Euclid is part of a larger story told by later-day Western historians that science originated with the Greeks, *as a race*. Here is an example of the tale from Rouse Ball.

The history of mathematics cannot with certainty be traced back to any school or period before that of the... Greeks.... Though all early *races*... knew something of numeration yet the rules... were neither deduced from nor did they form part of any science.⁴²

(Rouse Ball, who died in 1925, was Chairman of the council of Trinity College, and the chair named after him at Oxford is today occupied by Roger Penrose. Rouse Ball's book on the history of mathematics is still in circulation as a "classic" work, though some say it is racist bull.)

Rouse Ball's point of view is quite clear. He believed that the Greeks as a race did something extraordinary which other races could not do. He thought there was something special about the Greek genes that was missing in others, that Euclid's achievement was characteristic of the Greek race. Naturally, Rouse Ball also took it for granted that the color of Euclid's skin was white. Thus, the question about *where* Euclid was born gets transformed into a question of his race or the color of his skin.

3.3 The color of Euclid's skin

But how did Euclid's race or the color of his skin become part of the story? From a text in the Greek language we can no more infer the color of the author's skin than we can from a text in the English language. According to the story, the only thing we know about Euclid is that he lived in Alexandria. If Euclid lived in Alexandria, we can hardly be sure of his race, since Alexandria is located in Egypt in the African continent. Early Greek historians like Herodotus inform us that Egyptians had woolly hair and were black, because the heat of the sun turns skins black. So, perhaps Euclid was black?

This is where racist beliefs become manifest. Racists long maintained that blacks could be enslaved just because they were inferior. As we will see later on, they said blacks were inferior because they lacked creative achievements. That claim was based on a history which somehow attributed all Egyptian knowledge to Greeks. That is, this sort of history led to the belief that the Greeks, as a race, were vastly superior to the Egyptians. The claim persists today that the Greeks brought knowledge into Egypt, instead of learning from Egypt. On this racist belief, superior knowledge must be linked to the color of the skin.

But Herodotus informs us to the contrary that the Greeks aped all the customs of the Egyptians. That is but natural, for the Egyptian empire flourished for thousands of years before anyone had heard of the Greeks. The most learned Greeks like Pythagoras, Plato, and even Herodotus, educated themselves by travelling to Egypt.

True that, after flourishing for thousands of years, Egypt eventually went into a state of decline and was "conquered" by the army led by Alexander of Macedonia (Yugoslavia). However, Alexander's military "conquest" of Egypt had been a bloodless one. Moreover, military conquest in one direction led to a cultural conquest in the other.⁴³ We have already seen that Alexander accepted Egyptian customs and worshipped Egyptian gods. When his general Ptolemy finally became ruler of Egypt, it was according to Egyptian customs. The temple of Serapis could be built just because, as Herodotus rightly said, the Greeks had long aped Egyptian practices even in the matter of the gods they worshipped.

So perhaps Euclid was black after all?

3.4 Euclid's images in school texts

Today, it would be considered improper to refute this suggestion by using the kind of explicit talk of race used by Rouse Ball. Moreover, how can we hope to infer Euclid's genetic history when so little is known about him? However, while it is considered improper to *spea*k about the color of Euclid's skin, it is not considered improper to *show* images of Euclid. And any such image *must* make a tacit statement about the color of Euclid's skin. Thus, without a single word being said, the MacTutor website settles the doubt about Euclid's race by showing us a picture of Euclid as a white-skinned, Caucasian stereotype!

This picture also makes the story of Euclid seem quite solid and concrete—after all, isn't a picture a visual proof of the existence of Euclid? In the same vein of making Euclid seem quite concrete, the ninth standard mathematics text in India carried a similar picture of this "Euclid".⁴⁴ To make sure that the larger story about Greeks as a race gets across, without using the word "race", this school text shows several such pictures of various other Greek mathematicians such as Archimedes and Heron, who are also believed to have been from Alexandria. Needless to say, these worthies are all pictured as having the right color of the skin, and the right kind of facial features that are to be associated with superior knowledge. All these images are taken from what has become the key vehicle of propaganda today—the Internet—and implanted in the impressionable minds of young children through school texts.

It does not seem quite right to question a picture, but one does wonder from what primary source this image of Euclid came, since photography had surely not been invented in the time of Euclid. Perhaps the ancient Greeks made statues of Euclid which were later photographed? However, before we ask for evidence, let us get on with the story, not forgetting that Euclid's race is a key part of it.

3.5 The numerous works attributed to Euclid

In fact, after its initial hesitation regarding evidence, perhaps only for the sake of form, the MacTutor website throws to the winds all thoughts about evidence, and plunges into a long description of the enormous body of work attributed to Euclid.

Euclid's most famous work is his treatise on mathematics *The Elements*. *The Elements* is divided into 13 books. Books one to six deal with plane geometry. . . . Books seven to nine deal with number theory. . . . book seven. . . contains the Euclidean algorithm for finding the greatest common divisor of two numbers. Book eight looks at numbers in geometrical progression. . . . Book ten deals with. . . irrational numbers. . . . Books eleven to thirteen deal with three-dimensional geometry. . . . *The Elements* ends with book thirteen which discusses the properties of the five regular polyhedra and gives a proof that there are precisely five.

Euclid's *Elements* is remarkable for the clarity with which the theorems are stated and proved. It is a fascinating story how the *Elements* has survived from Euclid's time and this is told well by Fowler. . .

Needless to add, the Fowler referred to is the same David Fowler we have already met!

4 Euclid: The Evidence

To go by the stories, Euclid seems to have done a lot in his life. But what exactly is the *evidence* for those grand stories?

NOTHING, as David Fowler opined, is known about the person Euclid. So how should we proceed? The stock story about Euclid also admits that “nothing much” is known about Euclid. So we have only to decide whether the evidence amounts to “NOTHING” or to “nothing much”!

4.1 The expected evidence

Now, if there actually was a Euclid who wrote a book called *Elements*, we expect to find (1) manuscripts of that book with his name inside. (2) Those manuscripts must be from some time near his date. If that is not the case, or if there is uncertainty in dating the manuscript, we also expect (3) a continuous historical record or a chain of manuscripts from his time to ours, linking the manuscript we today have to the manuscript Euclid wrote.

The expected evidence, however, is nowhere to be found. First, we are dealing with a very peculiar situation where the expected evidence (1) is missing: Greek manuscripts of the *Elements* mention Theon, but never any Euclid, as we have seen. So, how exactly does Euclid come into the picture? Second, the earliest manuscript of the *Elements* is dated only as early as 888 CE. This date, as Fowler remarked, is closer in time to us than to the supposed date of Euclid.

Third, there is no continuous record (or a chain of interlinked Greek manuscripts and commentaries going back to that time). So, even if an original manuscript existed, we have no way to reconstruct its contents from the very late texts we actually have.

Let me explain this point. A *scientific* text keeps changing. It is continually updated to reflect the latest knowledge (or the latest

tinkering). Only a useless text would stay unchanged and no one would want to copy such a text so it would soon become extinct. That is, useful scientific texts are accretive: new knowledge keeps getting added to them, like rings to a tree.

In some cases this accretion is easy to identify. For example, sailors who navigated by the stars used astronomy texts. The early astronomy text *Almagest* has a list of stars useful for navigation. This list is headed by the current pole star. But the pole star keeps changing, and we know that was not the pole star in the time of "Claudius Ptolemy", its purported author. Therefore, this list was prepared later. Naturally, sailors were interested in *using* the list of stars, for what could be a matter of life and death at sea, and not in preserving the original star list in the text.

A computer program is a modern example of a scientific "text" which keeps changing. Computer programmers maintain a version history—a meticulous record of changes—just so that they can reconstruct any particular version if required. Reconstruction would be impossible without a continuous version history. But claims about early Greek achievements are not based on any such continuous historical record.

Some historians try to wriggle out of this situation by saying that that is the sort of evidence on which history is commonly built. But that is simply not true. Such records are available in other cases.

For example, in India, Āryabhaṭa wrote a book in the 5th c. Shortly after that, two mathematicians Varāhamihira and Brahmagupta criticised it in the 6th c. This was followed by a later commentary of Bhaskara in the 7th c., and then by Suryadeva Yajvan and so on, right until the 16th c. commentary of Nīlakanṭha. The commentaries reproduce the original text in full. This interlinked chain of consistent manuscripts from across the subcontinent and over centuries, from both critics and admirers, gives us confidence regarding the author, his date, and the original text, which we can reconstruct from a critical study of its versions.

It is *only* in the case of claims of Greek knowledge that the evidence is missing: all these grand claims are based on manuscripts from after the 12th c. Crusades.

These late manuscripts are of two sorts. The first consists of Latin translations of Arabic works, like the translations by Adelard of Bath and Gerard of Cremona from Crusading times. It was through these translations that Europe first learnt about the *Elements* in the 12th

c. Secondly, there are Byzantine Greek manuscripts from Christian sources in Istanbul. These are from even later (15th c.), and are basically Greek translations from the Arabic. Even Western historians admit they involve heavy inputs from Arabic sources.

To try to confound the origin, Western academics competitively date down these late Greek manuscripts to as early as the 10th c. Those early dates, from before the Crusades, mostly lack credibility. Anyway, a 10th c. date does not rule out Arab inputs, for the Arab investment in world knowledge was already in full bloom by the early 9th c. But let us accept the date of the earliest text of the *Elements* as 888 CE—a dozen years *before* the 10th c. Even so, that earliest text is more than a thousand years after Euclid's supposed date (–325 CE).

That is, we have no definite way to connect the actually available manuscripts of the *Elements* to either the person Euclid or to any time near his supposed date. The book could well have been written several centuries after the supposed date of “Euclid”. There is a big gap of a thousand years between the evidence (the manuscripts we actually have) and the hypothesis (that the original manuscript was written by a “Euclid” in –325 CE). There is no evidence to cover this huge gap of a over a thousand years; leaping across it involves using the imagination. This is problematic, especially when the imagination is a diseased, racist one.

Simply put, there is nil evidence for the story of “Euclid”.

4.2 The magic trick of myth building

Since there is no evidence, the straightforward thing to do is to reject the story of “Euclid”. However, power flows from the moral of a story. For example, a racist story teaches that racism is “moral”—as Kant and so many Western philosophers maintained (as we will see later on)—and that helps to justify the power of one group over another. To save their power, many people want to save the story which is the source of that power.

Saving a story involves the use of tricks. We saw one such dirty trick earlier: which is to slander the person who questions the story—thus moving the attention away from the evidence. Those whose power rests on false stories have many such tricks by which to save their stories.

Another more devious trick is this: tell a new story to explain *why* the evidence is missing. This is a general trick which can be used

to hang on to *any* story or belief, no matter how contrary to facts or commonsense. So, this is a trick every liar should know—as should every truth-seeker out to expose lies.

This magic trick to hang on to a belief—any belief whatsoever—works like this. We start with a story, any story. If someone objects that there is no hard evidence for the story, we tell a new story to explain why the evidence is missing.

But is there any evidence for the new story? Many people won't ask. If some do, and no evidence is to be found, it does not matter, for the trick can be repeated. The lack of evidence for the new story can always be explained by telling yet another story, and so on, as often as we like. Like a spider's web, the whole web of myths can hang from the most trifling support. And, as the web spins out, it becomes more and more complex; this web of stories entangles and traps human minds like a spider's web traps insects.

This is also known as the trick of "piling on the hypotheses". A hypothesis is a starting point for further investigation, something we assume and hope to prove or disprove by testing it against the evidence. If the evidence is against the hypothesis, we ought to reject it. That at least is what a truth-seeker will do. The trick, however, is that instead of rejecting the hypothesis, we try to "save" it, by putting forward a new hypothesis to explain why the evidence is missing. That way, a hypothesis never has to confront any evidence, for each time it fails to fit the facts, we advance a fresh hypothesis. As the counter-evidence piles up, so do the hypotheses, and we have a whole tower of hypotheses, but there is no evidence in sight, even from the top of the tower. Because any absurd theory or belief can be defended thus, this way is not conducive to truth.

This trick of telling a thousand stories to defend one is exactly like telling a thousand lies to defend one lie. Those who tell lies for power or profit are invested in those lies; they use this trick systematically. But instead of one person telling many stories, they employ a whole army of salespersons to do so.

Ever wondered how the church managed to preserve the most absurd lies for centuries? It has hundreds of thousands of priests to repeat its stories. If people are troubled by doubts or commonsense, the priests tell them to have faith!

How does the story of "Euclid" and the Greek origins of mathematics relate to present-day church propaganda? We will examine this question later. For the moment we have to be on guard against this

trick. How? If we ask for hard evidence and get only a story in return, then we can be sure this trick is being used.

4.3 The Dark Ages

Since the demand for evidence only leads to more stories, let us look at those stories first. The story commonly used to "explain" the absence of serious evidence for Euclid (and, in general, for claims of Greek scientific achievements) is that there was an intervening Dark Age when the evidence went missing. Now it is quite true that there was a time when all non-Christian books in Christendom were destroyed by Christians. But that is hardly an *explanation*: for we already know for a *fact* that the manuscripts are unavailable!

The full story is that the Dark Age was preceded by a Hellenic golden age and followed by a "renaissance" (meaning rebirth, from *naissance*=birth). These graphic terms of darkness and reawakening suggest, by analogy, that one person or culture went to sleep and woke up. The analogy *suggests* that the culture which "went to sleep" is the same one which "woke up". So, the real hypothesis is that there was a continuity between 14th c. Europe, *after* the Dark Age, and the "Hellenic" culture *before* the Dark Age.

To dispel these shadowy areas of suggestion, where strange creatures lurk behind every shadow, let us be more precise. Let us *define* the Dark Age as the time between the two religious wars instigated by the church.

That is, the Dark Age began with the complete destruction of all non-Christian books in Christendom, during the first religious war which the church fought against pagans, in the 4th and 5th c. It ended with the second religious war waged against Muslims, during which the church ordered the translation of non-Christian books, starting in the 12th c.

This definition makes clear the real historical hypothesis lurking under the story of the "Dark Age" and renaissance, which is this:

Hypothesis 1. The books translated after the Dark Age were *identical* to the books destroyed before the Dark Age.

The word "identical" is the key element of the hypothesis, for, otherwise, it may well be that one set of manuscripts was destroyed at the beginning of the Dark Age, and another set of manuscripts was translated at the end of the Dark Age. What is the evidence for this remarkable identity between destroyed and translated manuscripts

across six centuries? Ask for evidence, and you get a story (or further hypotheses) in return. That, as we know, is the trick.

So, the new story is that while the manuscripts were destroyed in Christendom, they survived elsewhere. Where? Among Arabs, or so the story goes, for that is from where the church translated books at the end of the Dark Age.⁴⁵

But, how do we *know* that the books translated during the Crusades were identical with the books destroyed? What is the evidence for it? After all, the destroyed books are no longer there, so we cannot put the two side by side and compare them. Expectedly, the evidence consists of another story! This new story too is not explicitly stated, but lurks with the rest of the brood under the phrase "Dark Age". It involves *two* further hypotheses to explain why the manuscripts translated after the Dark Age were identical with those destroyed at the beginning of the Dark Age.

Hypothesis 2. The knowledge in Arabic books at the end of the Dark Age came from the Greeks alone.

Hypothesis 3. The Arabs blindly copied books, without applying their minds, and therefore did not alter a word or a phrase in the Greek books, during the 600 years of the Dark Age between two religious wars.

These hypotheses are laughable. Even mere translation to another language and back can lead to loss of information. In an old joke, Hamlet's statement "The spirit is willing, but the flesh is weak" was translated into Russian and back. It came out "the vodka is good but the meat is bad"! The 12th c. translations from Arabic to Latin involved similar howlers, as we will see later.

Stating these hypotheses up-front opens them up to inspection. And the slightest inspection shows those hypotheses are false. For example, it is well known that Arabs took plenty of knowledge from India, as in al Khwarizmi's *Hisab al Hind*. It was from the Latin translations of this book that Christian Europe first learnt arithmetic beyond kindergarten level. As the title of the book (meaning "Indian arithmetic") says, al Khwarizmi used Indian sources.

In this case, we do have earlier sources, which we can actually compare with al Khwarizmi's book. Clearly, he wrote his own book in a different way. He did *not* blindly translate any one single Indian manuscript. There was a good reason for this: blind copying (*naql*) was the exact opposite of the then prevailing Arabic belief (in *aql*), which motivated al Khwarizmi's quest for knowledge.

This method of seeking knowledge far and wide, digesting it, and writing a new exposition, suggests that knowledge from different nations could have got mixed in Arabic books. That is, Arabic books could have included Egyptian knowledge, translated into Greek, together with knowledge directly imported from India, and knowledge created by the Arabs. This probably happened in the case of astronomy and logic.

Thus, both the above hypotheses (2 and 3) are false. The Arabs certainly took knowledge from non-Greek sources, such as Persia, and they did not blindly copy, but added their own creative contribution. In fact, in all cases where earlier manuscripts *are* available, we see that Muslims then *never* blindly copied. As simple, non-technical examples, Ibn Muqaffa changed the *Pañcalantra* story, to give it a moral ending, while the *Alif Laila* (*Thousand Nights*), taken from Persia, was similarly changed to include Arabic characters like Khalifa Haroun al Rashid and his prime ministers (*vazirs*) the Barmakids.

With the renewed Crusades against Islam, today, some are apportioning more credit to Muslims. This is a healthy trend, and we will look into this issue a little later. However, our immediate concern is with a completely neglected aspect of the stock story. The Christian renaissance signalled a reversal of church policy; it now sought to learn from non-Christian books, though it had earlier burnt all non-Christian books as heretical. If the earlier and later books were really the same, did the church take back its curses against those earlier books? Did it now say they were not heretical? Not at all. The church admitted no mistake. Instead, it spun out the story further: it attributed all valuable knowledge in Arabic books to *early* Greeks like Euclid or Archimedes.

So, apart from Arabs, the stock story also erases *late* Greeks, like Theon or Hypatia or Proclus.

The point about the early Greeks is that they came long before the advent of Christianity. Therefore, there was no possibility of any physical conflict between them and the church. This was quite unlike the late Greeks like Theon or Hypatia or Proclus, against whom the church fought the first religious war. The church regarded the late Greeks as its enemies and the early Greeks as its friends. These early Greeks came some 700 to 800 years before the start of the "Dark Age".

So the real hypothesis hiding under the phrase "Dark Age" is this.

Hypothesis 4. All worthwhile knowledge is the work of only Christians and their friends. Non-Christian others, such as Arabs, *and* late

Greeks, only preserved early Greek knowledge by blindly copying manuscripts for some 1400 years.

That is, only Christian Europeans (after the renaissance) and their early Greek friends were capable of being creative. It is not hard to understand the motivation for this hypothesis: this history comes to us from church historians who wanted to extol Christians and friends, and belittle all others. This fantastic and contrary-to-commonsense story has been hammered into our minds by Western historians for so many centuries that it is the accepted knowledge today. Open any encyclopedia, and you will find that is the way history is told today. The story is always the same: it describes the supposed achievements of the "Hellenic Golden Age", and then moves on to the Christian renaissance.

If we can go all the way back to the early Greeks, why not go further back to the grand civilization of Egypt? By hypothesis 4, chanting the mere name "Euclid" magically eliminates any role for Egypt, along with Indians, Arabs, and late Greeks. It was on the basis of this name-chanting history that Kant, Hume, and other venerated Western philosophers opined that only white-skinned people could be creative. How did the belief in Christian supremacy get transformed into the belief in white supremacy? This required only a short step, as we will see later on.

4.4 Who wrote the *Elements*? Two theories

Now, this sort of story-telling magic, devoid of all commonsense, can continue forever: at least it has continued for so many centuries! We must, however, *insist* on the evidence. The best way to do so—the scientific way—is to have a counter-story. Having two competing theories forces us to focus on the evidence. It helps us to arrive at the truth, for we can compare the two theories, and select that theory which *better* fits the evidence.

Let us look more closely at the holes in the story of "Euclid". Thus, even if we were to suppose, for the sake of argument, that Arabs copied blindly, that does not help us to identify the original source. Was the source manuscript at the beginning of the Dark Ages, in the 4th c., or long before that in the -4th c.?

For example, Western scholars today say that the works of Plotinus (+3rd c.) were wrongly attributed by Arabs to Aristotle (-4th c.). Could the same have happened in the case of "Euclid"?

That is exactly what we should expect. For we have already seen (p. 14) that the Greek manuscripts of the *Elements* all state that they derive from Theon (late 4th c.) or are based on his lectures. The straightforward way to understand this statement is to suppose that the *Elements* was written in the early 5th c. after Theon, based on his lectures. We know that Proclus, who lived in the 5th c., wrote a commentary on the *Elements*. So the *Elements* was written after Theon, but before Proclus. The mysterious “author of the *Elements*” must have lived at this time between Theon and Proclus. Commentators had some reason to hide the identity of the author.

Note that, in this case, “writing the *Elements*” is no longer synonymous with “the beginning of geometry”. The “author of the *Elements*” was not the father or mother of geometry. Geometry certainly existed from thousands of years before that in Egypt and India, and even in Greece. However, it is perfectly possible to write an excellent and appealing book gathering together the traditions relating to an old subject, just as there are books written today on ancient subjects like yoga.

So, we have two theories:

(A) the *Elements* was written shortly after Theon (and before Proclus), in the early 5th c. CE by a mysterious author whose identity the commentators wanted to hide, and

(B) the *Elements* was written by an unknown “Euclid” some 750 years earlier.

The straightforward evidence supports the mystery-author theory (A), and is contrary to the Euclid theory (B). Accordingly, we should reject the Euclid theory (B) at this point.

However, let us give it a long rope, and investigate also the round-about evidence. The theory (B) assumes that there was a Euclid who wrote the *Elements*. If such a person existed, he must surely have existed somewhere. Where?

4.5 Euclid of Megara

Greek tradition associated the name “Euclid” with a certain Eucleides from Megara (a town near Athens). And it came to be believed that Euclid the geometer was from Megara. This belief was so widespread that the first English translation of the *Elements*, in 1570, unhesitatingly credits the book to Euclid of Megara.

THE ELEMENTS OF GEOMETRIE

of the most auncient Philosopher EVCLIDE of Megara
Faithfully (now first) translated into the Englishe toung, by H. Billingsley,
Citizen of London. Whereunto are annexed certaine Scholies, Annotations,
and Inuentions, of the best Mathematiciens, both of time past, and in this our
age.

With a very fruitfull Preface by M. I. Dee, specifying the chiefe Mathematicall
Scieeces, what they are, and whereunto commodious: where, also, are disclosed
certaine new Secrets Mathematicall and Mechanicall, untill these our daies,
greatly missed.

Imprinted at London by John Daye.

Figure 4.1: The author of the *Elements* is identified with Euclid of Megara on the title page of its first English translation in 1570.

So, for some *five hundred years*, the author of the *Elements* was thought to be Euclid of Megara, and this was taught as the authoritative truth in universities like Paris and Oxford. It was only in the nineteenth century that historians started asking for evidence, and noticed an elementary difficulty. According to Greek tradition, Euclid of Megara was a contemporary of Plato, probably older than Plato. But a remark from Proclus' *Commentary* (see below) says that Euclid came *after* the pupils of Plato. How can these two things be reconciled?

So, our hero must have been another "Euclid", and identifying the author of the *Elements* with Euclid of Megara was a mistake.

Such a mistake is understandable, but its persistence for five centuries is not. That proves that Western historians are completely unreliable, for they thought of the evidence only after five hundred years.

This also shows that just because a story has been told for centuries it does not become real. On the contrary, there seems something fundamentally wrong with Western culture, for it kept alive such false myths for centuries.

Have Western historians learnt from this mistake? Do they now say "We do not know where this Euclid was from"? No. Today we are told: "Little is known about Euclid *except that he taught at Alexandria*." This suggests that we know for sure that there was a Euclid who was from Alexandria. But, in fact, there is no evidence at all to tell us that there was a Euclid nor where he was from—whether from Alexandria

or from Tyre. These historians are still palming off their prejudices as facts. The story might have changed, but the method has not.

4.6 A single remark

The case of Euclid of Megara shows that Western historians are unreliable. This is all the more reason to focus on the evidence.

We have already seen that there is no direct evidence for Euclid. The roundabout evidence consists of the following short passage in another book (Proclus' *Commentary on the Elements*).

Not much younger than these [pupils of Plato] is Euclid, who put together the *Elements*,... bringing to irrefragable demonstration the things which had been only loosely proved by his predecessors. This man [must have] lived in the time of the first Ptolemy; for Archimedes, who followed closely the first [Ptolemy? book?] makes mention of Euclid, and further they say that Ptolemy once asked him if there were a shorter way to study geometry... to which he replied that there was no royal road to geometry. He is therefore younger than Plato's circle, but older than Eratosthenes and Archimedes; for these were contemporaries, as Eratosthenes somewhere says.

That's it: *the key evidence for "Euclid" is this single passage from another book—no dates, no statues!* Some other Greek manuscripts have stray references to Euclid. But they are so late that even Western authors admit they are unreliable.

Of course, scholars concede that even this passage is not *fully* reliable. For example, the anecdote about Euclid's interaction with Ptolemy is fictitious. The story—that there is no royal road to geometry—is a common enough story. It has been told also about Alexander, and a geometer of his times called Menaechmus.⁴⁶ So, the story concerns geometry proper, not Euclid, and we will see the real point of the story later.

But if part of the testimony of a witness is unreliable, all of it could well be. So, we need to be sceptical and ask: how do we know this "Proclus passage" about "Euclid" is reliable?

4.7 Why was “Euclid” so little known for 8 centuries?

Now, Proclus comes some 8 *centuries* after the supposed date of “Euclid”. From what earlier sources then did Proclus learn about “Euclid”? The passage does not tell us. Does the context of the passage perhaps provide clues to its sources? Let us look at it.

Proclus starts off by saying that geometry originated in Egypt from where Thales brought it to Greece.⁴⁷ Proclus then mentions Pythagoras, Plato, and Plato’s pupils. The next statement, a key statement which immediately precedes the oft-quoted remark about “Euclid”, is this:⁴⁸

All those who have written histories [of geometry] bring to this point their account of the development of this science. Not long after these men [pupils of Plato] came Euclid...

So, the author of the passage is providing us with *new* information about a “Euclid”. He is telling us that earlier historians of geometry do *not* mention Euclid!

This is astonishing! Some 8 centuries separate Proclus’ commentary (ca. 470 CE) from the supposed date of Euclid (ca. –325 CE). Why did historians of geometry neglect Euclid for 800 years? One hears now and then of people being recognized after their death—but a delay of 8 centuries is rather a long time even for belated recognition!

4.8 The problem of papyrus technology

But if Euclid was not well known for such a long time, until the 5th c., another difficulty presents itself: how, then, did his book survive for so long?

Even in our times, it would be an extremely difficult matter to source a book by an obscure author of 800 years ago. But the book technology of the Egyptians in Alexandria used papyrus, not paper. Made from a grass-like plant that grows in the Nile delta, papyrus was fragile, brittle and easily damaged even with the little handling required for reading. Papyrus books did not last long.

Such books could be preserved only by repeatedly copying them. There were no mechanical photocopyers then, and all copies were made by hand—by human scribes.

Someone would have had to support that scribe, and pay him for the job. Why would a number of different people at different times have invested in scribes to copy out a book by an unknown author? Conversely, if many different people at different times did invest in this author, why did the author remain unknown?

This illustrates the problem with piling on hypotheses, or the technique of using a thousand lies to defend one lie. It only leads to more questions, more hypotheses, and more lies, in an ever-increasing spiral. Under the circumstances, simplicity is the path to truth. It is simpler to suppose that this "Euclid" did not exist.

4.9 An isolated passage

But if "Euclid" did not exist, how do we explain that passage about "Euclid"? Let us re-examine it. Not only does the author of the passage believe he is the first historian of geometry to mention "Euclid", he also believes this "Euclid" merits no further mention!

This is strange. Thus, the passage comes from a book which historians call Proclus' *Commentary on Euclid's Elements*. (This is dishonest, of course, for the word "Euclid" was not in its original title.) If Proclus were indeed writing a commentary on the work of a "Euclid", and if he were the first historian in 800 years to have noticed this "Euclid", one would imagine that he would have mentioned this "Euclid" at every opportunity. So, it is surprising how, instead of the name "Euclid", Proclus' text prefers to use the longer term "author of the *Elements*". And it is not as if Proclus avoids names: for he mentions various names from Apollonius to Zeno. It would be unnatural for Proclus to mention Euclid in just one passage, and keep him anonymous elsewhere in his commentary.

So, Proclus, author of the commentary on the *Elements*, was probably *not* the author of that key passage about "Euclid", which is interpolated or forged.

4.10 Is the passage due to Proclus?

The date of the manuscript

Once again, let us look at the evidence.

The passage in question is found in a book believed to have been authored by Proclus. But where does our knowledge of Proclus' book

come from? It comes from a manuscript called "Monacensis 427".⁴⁹ The exact date on which this manuscript was written down is *not* known, but has been variously estimated. The most optimistic date for this manuscript is the tenth century—some 500 years after Proclus.

It would be a lot more realistic to assign a much later date to the manuscript, about 900 years after Proclus, for the manuscript is on paper, not papyrus.

Although paper was known early on in China, and had reached Baghdad by the early 9th c. CE, it made a late entry into Europe. The first paper mill in Europe (outside Spain, which was under Arab rule) was founded in Hérault in France in 1189 CE, and the next in Bologna in Italy in 1293 CE.⁵⁰ It is logical for supply to match demand; a paper factory could be started only if there was enough demand for paper, and the demand for paper registered in Europe only after numerous Latin translations of Arabic books suddenly became available in the 12th c. CE. So paper started becoming common in Europe only around the 13th and 14th c. CE. The manuscript of Proclus' book probably comes from this period or later.

Byzantine Greek texts came to Europe in a big way, like the Greek texts of the *Elements*, after the fall of Istanbul (Constantinople) to Mohammed the Conqueror in 1452. "Monacensis 427" probably comes from this period, in the 16th c., a much later date than has been supposed.

Thus, the "Proclus passage" (the key evidence for "Euclid") is actually an isolated passage in a manuscript from at least 500 years, and probably 1000 years after Proclus.

Is the passage an interpolation?

This sort of "evidence" is not reliable for straightforward reasons. Thus, the original book that Proclus wrote is one thing, and the manuscript copy of it that we have with us is another—and many centuries separate the two. During these centuries, the passage could have been added to Proclus original manuscript by another scribe.

For example, we saw how the first English translation of the *Elements* added the spurious information that Euclid was from Megara. The translator mistakenly thought this information to be genuine, and added it.

Is the passage a forgery?

Apart from such well-intentioned interpolations, there could also be deliberate forgeries.

For example, unlike the Greeks who viewed Bacchus symbolically, just as earlier Egyptians viewed Ausar (Osiris), the church interpreted Iesu (Jesus) as an actual historical figure. People objected that there were no historical records of Jesus, and that even the Roman historian Flavius, writing around 90 CE, made no mention of Jesus. To meet this objection, a crudely forged passage was introduced into Flavius' work, as proof of the historicity of Jesus. Amusingly, this forgery was given an imposing Latin name: *Testimonium Flavium*—meaning “testimony of Flavius”!

Such forgeries were common practice with the church. Another famous forgery is the “Donation of Constantine”, a document on which the Vatican is founded. Note that the discovery of the forgery after a thousand years did not in any way affect the status of the Vatican.

So, how can we be sure that Proclus was the actual author of that passage about Euclid? Proclus may indeed have authored much of the *Commentary*—but the passage about “Euclid” could have been interpolated or forged by a later scribe.

4.11 The spurious Archimedes citation

We have good reasons to believe that this is exactly what happened.

Recall how the passage fixes the date of “Euclid”. The reasoning is indirect (and surprisingly modern). According to the passage, since this Euclid is *not* mentioned by the pupils of Plato, but is mentioned by Archimedes, therefore, “Euclid” must come after the pupils of Plato, and before the time of Archimedes.

Let us cross-check this. How do we know that Archimedes did indeed mention “Euclid”? The moment we ask this question, a serious problem arises. The problem is that we know even less about Archimedes than the “nothing much” that we know about “Euclid”! Archimedes is no more than a mere name, a character in a famous story who went around shouting “Eureka”. The actual works of Archimedes are known only from 14th c. CE Latin translations of works *believed* to be those of his commentator Eutocius, who is *believed* to have lived in the 6th c. CE—some 800 years after Archimedes!

(Of course, we know nothing of the actual sources used by the original Latin translation of the 14th c. which itself is lost, but some copies of the translation seem to have survived.) From this sort of vague information about Archimedes, it is very hard to be sure exactly what Archimedes said, or did not say. This is how one myth (about Archimedes) begets another (about "Euclid"). However, let us push ahead.

Curiously, even among the works today attributed to Archimedes, the name "Euclid" is not to be found. In fact, there is only one known work attributed to Archimedes (*On the Sphere and the Cylinder*⁵¹) where a reference is found to the *Elements*. To reiterate, we have no serious evidence to connect this late manuscript to Archimedes. Furthermore, even in this "Archimedes manuscript" the citation is of the book *Elements*, and it does *not* mention the person "Euclid", so that is no sort of evidence for "Euclid". The author of the "Proclus" passage has carelessly conflated the book *Elements* with the person "Euclid".

Some historians⁵² have already opined that this citation of the *Elements* by "Archimedes" is spurious. They have advanced two reasons. First, it was not the custom in the days of Archimedes to cite other books in such a way. Second, there are many other places in the work *Sphere and Cylinder* where such citations of the *Elements* could have been made but are not there. That is, even if we suppose that the "Archimedes manuscript" actually relates to a work of Archimedes, the citation of the *Elements* in it is a later-day interpolation.

It is easy to understand why it was not the custom in the days of Archimedes to refer in the modern way (for example, to *Elements* XII.2, or the second theorem of the twelfth book of the *Elements*). Standardised editions of books did not exist then.

Even as late as the 10th c. CE, there were often differences in the number of pages in a text due to differences in handwriting, for example, so that referring to page numbers was impractical those days. Texts began to be standardised only after printing technology had arrived in Europe in the 15th c. CE.⁵³ It is only after that that it became the custom to provide references in the style *Elements* XII.2. Since the reference to the *Elements* in the works of Archimedes is exactly in this style, it must be a later-day interpolation.

The other argument pretty much settles the issue. Why is this reference to the *Elements* found in only one place? This looks like a

marginal note made on one manuscript, perhaps copied out by a later scribe who mistook it as part of the original.

While the "Archimedes" citation tells us nothing about any person called "Euclid", it does tell us something about the author of the "Proclus" passage. If the reference to the *Elements* in the works of Archimedes is spurious, and of late date, how could Proclus have known about it? If this spurious "Archimedes" citation was known to the author of the "Proclus passage", then the "Proclus passage" itself must postdate the spurious "Archimedes citation". The "Proclus passage" therefore postdates Proclus by several centuries, and is itself spurious. In fact, that would place the "Proclus passage" as probably a 16th c. forgery.

That pretty much settles matters about "Euclid". Banking on the evidence of one isolated passage is bad enough. But even that one doubtful passage about Euclid relies on another isolated remark by "Archimedes" which is definitely spurious. So, there is no serious historical evidence for the myth of "Euclid".

4.12 The archaeological evidence

Western history was mostly written by Christian priests and academics trained by them. They tended to treat all texts like the scriptures, as gospel truth, placing great weight on single passages, and even individual words in them, regarding this as ultimate proof. We saw above why such textual evidence from Western texts is ever so often unreliable. So, it is always a good idea to check the non-textual evidence. The more solid evidence from archaeology corroborates that this "Euclid", if at all he existed, was little known until the 4th c. CE. This archaeological evidence is in the form of preserved papyri.

Thousands of papyri have been recovered from "Hellenic" times, that is, from Egypt in Africa, though only two papyri come from Greece proper. This paucity of papyri from Greece suggests that the Greeks, unlike the Egyptians, were not much into reading and writing books prior to Alexander. As for mathematical papyri, some Egyptian papyri, like the Rhind papyrus, are very ancient, being about 4000 years old, and unquestionably show that the Egyptians had a good knowledge of mathematics even then.

In contrast, it is curious that despite the oft-repeated claims of "Greek" or "Hellenic" achievements in science, no comparable scientific papyri are available even from Alexandria. In fact, only three

among these thousands of Alexandrian papyri relate to any work that could be called scientific or mathematical—to geometry, in fact.⁵⁴ These three fragments are believed to date from the 2nd to the 4th c. CE (though they may be from later), and correspond to about 60 full lines of text, together with some fragmentary information on another 60 lines.

However, *none of these available fragments follow the “received” text*,⁵⁵ or the current text of the *Elements*. Now, on both the theories (A) and (B) geometry certainly existed before the *Elements*. But, had there really been a “Euclid”, who compiled a definitive book on geometry called the *Elements* as early as –300 CE, then a standard text of the *Elements* should subsequently have been in circulation. The archaeological evidence shows that clearly did not happen.

Thus, these papyri findings are strong evidence for the *absence* of a definitive text of the *Elements*, until around the 4th c. CE. This supports theory (A) that the *Elements* was composed around the 5th c., after Theon.

4.13 Why was the *Elements* written?

When confronted with the lack of evidence for “Euclid”, many people feel that there is an easy way out. The important thing, they argue (like Peter Flor, earlier), is the *Elements*, not so much its author.

However, this is facile. The issue of *who* wrote the *Elements* is connected to *why* it was written. The belief that the *Elements* was written for “irrefragable demonstration” is based on just two words in the above passage. Take away that spurious passage in Proclus’ *Commentary*, or just those two words in it, and that completely changes the reason why the *Elements* was written, for we must take seriously what Proclus says elsewhere in the same book: that he wrote the *Commentary* to explain that the study of mathematics is important because it leads to the “blessed life”. Plato, too, said something similar, as we will see. So, why should we allow those two words to override this long tradition?

Note a further trick. The present-day account of why the *Elements* was written not only rests on just those two words in a spurious passage, it juggles the exact meaning of those words. The story simplistically supposes that all are agreed on what exactly constitutes an “irrefragable demonstration”. Hilariously, according to the passage itself, “irrefragable demonstration” is based on “causes and signs”.

Today that would be related to physics and astrology, and regarded respectively as fallible and pseudo science and, therefore, very much refragable. This part of the passage is either omitted by “standard” accounts, or glossed over, so they can continue the pretence that “irrefragable demonstration” according to the author of the passage is the same as it is understood today. In fact, there is no universal agreement even today on what constitutes “irrefragable demonstration”.

On Western beliefs, mathematical proof provides “irrefragable demonstration”, and this must be 100% metaphysical. (If not, it ceases to be mathematics—at least that has been the Western view.⁵⁶) This was the point of Rouse Ball’s racist remarks quoted earlier, which we quote again in full.

The history of mathematics cannot with certainty be traced back to any school or period before ...the ...Greeks...though all early races...knew something of numeration...and though the majority were also acquainted with the elements of land-surveying, yet the rules which they possessed were in general founded only on the results of observation and experiment, and were neither deduced from nor did they form part of any science.

That is (according to the Western view, as stated by Rouse Ball), the key element of science (not just mathematics) is metaphysical deduction, and not “mere” physical observation and experiment. This is what makes mathematical proofs “irrefragable”, or so it is believed. And this, as the story goes, was the fundamental contribution of “Euclid”, who supposedly inaugurated the deductive method.

Alas, this racist story rests on that passage which we now know to be a forgery, and Proclus says something different elsewhere.

4.14 A fishy proposition

Instead of going by what Proclus says, let us decide the real intentions of the author of the *Elements* by looking at the book *Elements* itself.

The first proposition⁵⁷ of the *Elements* is about constructing an equilateral triangle (all sides equal) on a given line segment. (Some people may better remember this from school geometry as the way to construct a right angle on a given segment.)

The proof of this proposition involves a construction. Given the segment AB, one constructs a circle with centre A and radius AB. Next

with centre B, and the same radius, one constructs another circle. The two circles intersect at two points C and D, as in the figure. (Usually, in school geometry, one just constructs the arcs of the circle, to identify the points of intersection C and D.) Joining the point C to A and B, we obtain the required equilateral triangle. (And, joining the point C to D gives a straight line CD at right angles to the straight line AB.)

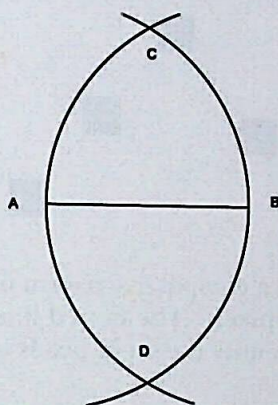


Figure 4.2: The first proposition of the *Elements*.

This proof is clearly an empirical or physical one. We *see* the arcs intersecting, but sight is a physical matter. So, the proof of the very first proposition of the *Elements* deviates from the imagined Euclid's imagined intention to provide 100% metaphysical or deductive proofs. We will see later on the 20th c. attempts to save the Euclid story from that fact. For the moment, let us note the proof is very much refragable.

The doubt is this: how do we *know* for sure that the two circles (or arcs) actually intersect? To be sure, we *see* this, but that could be just an optical illusion. For example, if we draw two such circles (or arcs) on a computer screen, they will *seem* to intersect. But a computer screen actually consists of a large number of discrete pixels. So, if we zoom in to what seems the point of intersection, the smooth curve will first become jagged, and then just become a set of pixels. We see that the two circles may intersect as in Fig. 4.3 or *may not* intersect, as in Fig. 4.4, because pixels are discrete and finite in number. In the second case, the two arcs pass "through" each other and do not have a pixel or point in common. (To be sure, there were no computers

when the *Elements* was written, but the same thing would happen with atomism which was then a common belief.)

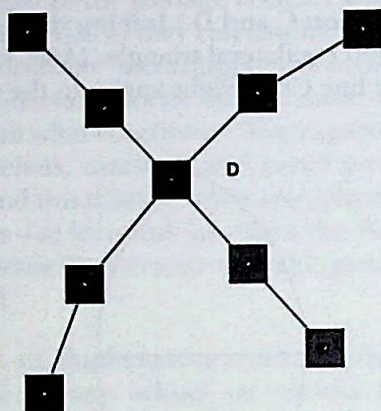


Figure 4.3: Two arcs on a computer screen at ultimate magnification. The squares represent pixels. The dotted line is only an aid to the imagination, to help identify the set of pixels which form an arc.

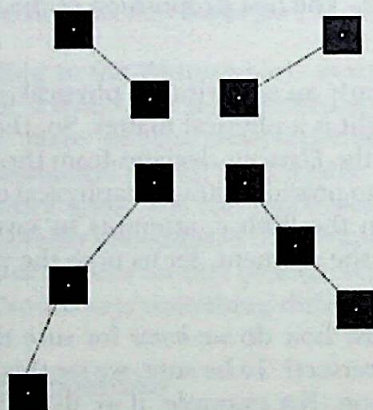


Figure 4.4: The doubt about the first proposition of the *Elements*. Two arcs on a computer screen at ultimate magnification may fail to intersect, even though they seem to intersect. The squares represent pixels. The dotted line is only an aid to the imagination.

The common Western reaction is—of course—to rush to “save the story”, by talking about Dedekind cuts, something from the 19th c. which students of advanced calculus learn today. In fact, Dedekind

cuts need a further story, that of axiomatic set theory, which is so complicated that few mathematicians ever learn it. This is an example of how the web of stories can become so complex that the trapped mind gets confounded and gives up. We will avoid those complicated stories in this book, though I have explained the failings of Dedekind cuts and set theory elsewhere. To be sure, the story of Euclid and his metaphysical proofs can be saved—any story can be saved for any length of time by piling on enough hypotheses.

However, the need to pile on the hypotheses and tell ever more complicated stories arises just because the evidence of the book *Elements* does *not* support the claim that the *Elements* was written with a doctrine of “irrefragable”, metaphysical proof, as that forged passage would have us believe. For seven centuries, Western scholars believed that claim without applying their mind to the very first proposition of the *Elements*, the proof of which is both refragable and physical. Based on that trivially false claim, they spun enormous stories of their own racial superiority, like that of Rouse Ball. So, this is even more hilarious than the case of “Euclid of Megara”.

If we reject the Euclid theory (B), and go by the straightforward theory (A) then the *Elements* was written for a different reason, more appropriate to that time. The book is certainly *not* about any one kind of proof, for Proclus explicitly allows different kinds of proof, saying that “Proofs must vary... with the kinds of being”.⁵⁸ Accordingly, Proclus had no difficulty with empirical proofs at the beginning of mathematics. As for the ends of mathematics, Proclus says mathematics leads to the “blessed life”, so he saw the *Elements* as a sort of religious book. That completely changes our understanding of the *Elements* for Proclus was a “pagan” and writing at a time when the church was waging a religious war against “pagans”.

On this understanding, there is a very simple explanation for the first proposition in the *Elements*. The figure of two intersecting arcs looks like a fish (and in Indian mathematical manuscripts it is actually called the “fish-figure”). We can see this better by turning it around, so that the fish is horizontal.

Now, the Greek word for fish is *ichthys*. Christians commonly read this as an acrostic (“Iesous Christos, Theou Huios, Soter”, meaning “Jesus Christ, son of God, saviour”). Many, then, related Christ to the dawning of a new age, the astrological age of Pisces (the Latin word for fish). The sign of the fish, constructed using two intersecting arcs (sometimes with an embedded cross), was used as a secret sign by

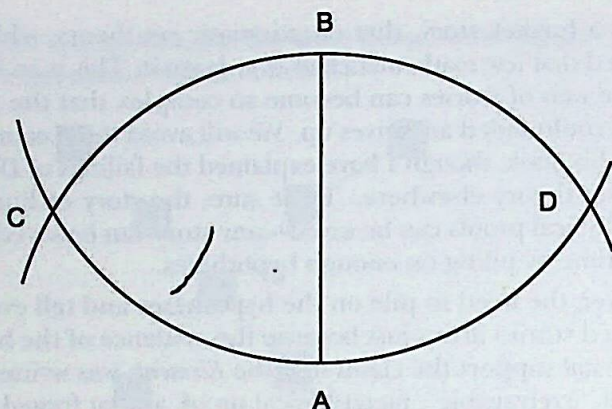


Figure 4.5: The figure that goes with the first proposition of the *Elements* looks like a fish, and is called the fish figure in Indian mathematical and astronomical texts.

Christians to recognize other initiates. The appearance of this sign at the beginning of the *Elements* therefore suggests that it is a book addressed to Christians (to explain to them a different set of religious beliefs).

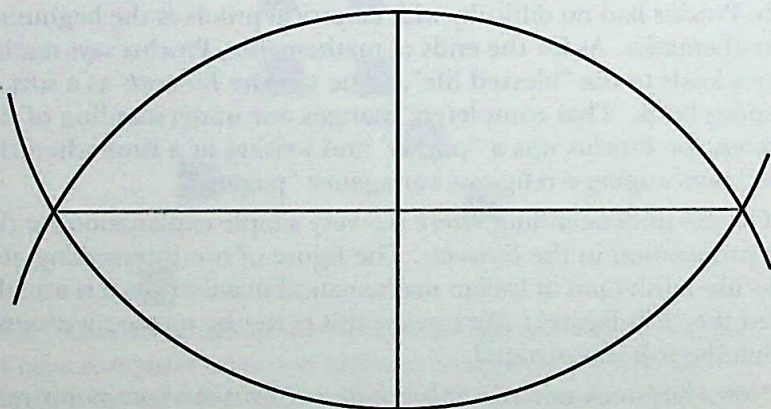


Figure 4.6: The fish figure is used to construct perpendicular lines, and hence comes with a cross. Hence also Christians accepted it as their secret sign.

4.15 The social circumstances

The question of *who* wrote the *Elements* and *why* closely relates to *when* it was written. Books are usually written in response to some pressing social need. In response to what social need was the *Elements* written? Answering this question provides another kind of non-textual evidence, concerning social circumstances, completely ignored by church history.

Now we already know that the Euclid story is false, and that the conjectures about "Euclid's" date and aim rest on a single spurious passage. Nevertheless, refuting the story from a different angle provides new insights.

First, since nothing is known about "Euclid", we do not know his exact time and place. Because the story of "Euclid" is so vague, we cannot pinpoint the exact social circumstances prevailing then. This shows how vagueness helps to preserve false claims, for there is nothing definite to cross-check against the evidence.

Anyway, on the "stock" story today "Euclid" lived around -300 CE in Alexandria and wrote the book as a model of "irrefragable demonstration".

The key question is this: why was "irrefragable demonstration", howsoever understood, the need of the hour?

In ancient India, for example, an elaborate mode of argumentation and debate developed because a large number of schools of thought flourished, and they aired their sharp difference by debating with each other (and not by trying to physically eliminate the other). Conversions took place due to defeat in debate, and not defeat in war.

In contrast, in the Athens of ancient Greece, Socrates was killed for holding different opinions. Medieval Europe too was intolerant and had no tradition of debate: pagan Europe was converted to Christianity through war, not debate.

With force as the main argument, there was no need for "irrefragable demonstration". It was only when force failed with the Muslims, as became clear with the military failure of the later Crusades, that Europeans first felt the need for debate and means of "irrefragable demonstration". This was exactly the time when the *Elements* first came to Europe, so we can very well understand why in *those* social circumstances the *Elements* was *interpreted* as providing a means of irrefragable demonstration.

However, the situation in Alexandria at the time of Ptolemy I (when "Euclid" supposedly lived) was similar to that of Athens in the

time of Socrates, a few years earlier. Ptolemy I was one of Alexander's generals who became satrap of Egypt after Alexander's death. He was constantly fighting petty wars and conscripting all able-bodied men for this purpose. So, the social circumstances then were not conducive to scholarship and debate, so there was no need for irrefragable demonstration at that time.

4.16 The clash of philosophies

On the other side we can ask: what were the social circumstances prevailing at the time of Theon?

To understand how those circumstances relate to the *Elements* we must first know that the two theories of the origin of the *Elements* also embody fundamentally different philosophies of mathematics. On the theory (A) the *Elements* was written with the philosophy of mathesis, contrary to church doctrine. On the theory (B) the *Elements* was written with the philosophy of mathematics as deductive proof, agreeable to the church after the Crusades. The striking clash between the two philosophies is most easily judged by the social consequences: the church extolled "Euclid" but denounced Proclus, and declared Hypatia's killer to be a saint, just for the reason that he finished off the heretics.

So, what made mathesis important at the time of Theon? How does mathematics lead to the blessed life and why was it necessary for someone after Theon to explain this to Christians?

5 Geometry and the Soul

5.1 The origin of geometry

Who wrote the *Elements*, when and why? If Euclid did not exist, he could hardly have written it. Since that passage about “Euclid” is spurious, “irrefragable demonstration” need not be the reason why the *Elements* was written. Books are usually written in response to some pressing social circumstances, and these change over time. A different author who wrote the book at a different time would have had a completely different purpose. Changing the answer to “Who?”, changes the answer to “When?”, and also the answer to “Why?”.

For a fresh understanding of the *Elements*—who wrote it, when and why—we need to examine the history of geometry afresh.

According to Herodotus, the Greek historian, geometry began in Egypt.

Herodotus says that, in the beginning, Egyptians were all assigned square plots of land of equal size. They were all required to pay equal rent to the king. The Nile, in the course of its annual floods, carried off some part of a man's land. He appealed to the king to reduce his tax burden. The king sent some persons to examine the matter and measure the remaining land. Thenceforth, the man was required to pay only a reduced rent in proportion to the land that remained with him. This became the custom.

This exercise of measuring the land came to be known as geometry, which literally means geo-metry, or land-measurement.⁵⁹ Herodotus' story perhaps has a deeper symbolic significance in terms of the relation of geometry to equity and justice. Without tarrying to consider this possibility, the stock story today quickly moves on to “Euclid”.

Now, geometrical figures appear in the Rhind papyrus, dated to some 2500 years before the first known manuscripts of “Euclid”, so this is a jump of some 2500 years.



Figure 5.1: The Rhind papyrus, which shows Egyptians did geometry some 2500 years before the earliest known manuscript of “Euclid”.

This giant leap in the story, from Egypt to “Euclid”, suppresses an inconvenient but crucial point. Between the beginning of geometry in Egypt and the supposed date of “Euclid”, we also hear about geometry and mathematics from other Greek sources—the philosophers, such as Pythagoras and Plato. They tell a completely different story which is also what we hear from Proclus. That little passage about “Euclid” and “irrefragable demonstration” was long used to suppress these alternative voices. Having set aside that passage as spurious, we need to pay attention to what we constantly hear about mathematics from those philosophers over so many centuries.

These philosophers connect mathematics and geometry not to land measurement, but to the *soul*; not to *practical* necessities, but to *religious beliefs*.

5.2 The practical unimportance of the *Elements*

The *Elements*, as its name suggests, concerns elementary geometry. It has so little practical value that in India it was not translated from the Persian into Sanskrit for several centuries.⁶⁰

Some Greeks, too, similarly regarded the *Elements* as trivial from a practical viewpoint. The followers of Epicurus used to mock the

Elements, saying that its propositions were so elementary that even an ass knew them. As an example, they picked proposition 20 of the *Elements*, which says that “two sides of a triangle are greater than the third”. They said (see Fig. 5.2) that the ass went straight to the hay, and did not go by the longer route corresponding to two sides of a triangle, and this demonstrated that even an ass understood the geometry of the *Elements*!

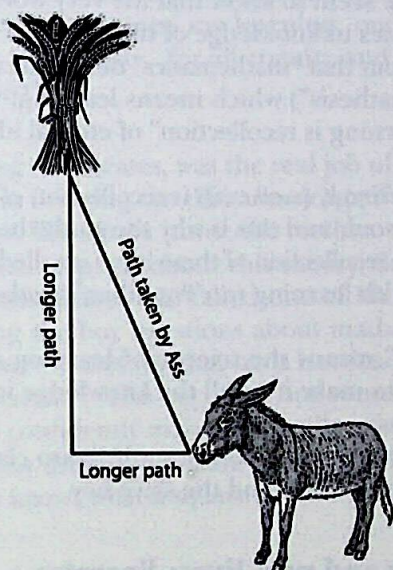


Figure 5.2: The Epicurean Ass: To demonstrate that the *Elements* had no practical value, the Epicureans argued that any ass knew what was in the *Elements*, since the ass went straight to the hay, and did not follow the longer route. (The 20th proposition of the *Elements* says that two sides of a triangle are greater than the third.) Similarly, the *Elements* remained untranslated in India for some seven centuries, since the book was regarded as not of any secular or practical value.

The second-last proposition of the *Elements* (Proposition 47) is the so-called “Pythagorean theorem”, which does have practical value. But, the great pyramids of Egypt are standing testimony to the fact that this “theorem” was certainly known to the Egyptians long before Pythagoras, who probably learnt it in Egypt. It was certainly also known in India and China long before the time of Pythagoras, and

Indian texts in mathematics *began* by proving this theorem instead of ending with it. So, what exactly was the point of writing the *Elements*? What made it such a celebrated book? To understand this we need to see mathematics from the perspective of the philosophers.

5.3 What mathematics means

Indeed few people seem to know that the very word “mathematics”, by derivation, relates to knowledge of the soul.

Proclus points out that “mathematics” derives from the Greek word “mathesiz” (or “mathesis”) which means learning. He thought, like Plato, that “all learning is recollection” of eternal ideas in the soul.

learning ($\mu\alpha'\theta\eta\sigma\iota\varsigma$ [*mathesiz*]) is recollection of the eternal ideas in the soul; and this is why the study that especially brings us the recollection of these ideas is called the science concerned with learning ($\mu\alpha'\theta\eta\mu\alpha\theta\iota\kappa\eta'$ [*mathematike*])⁶¹

So, “mathematics” means the science of learning or the science of arousing the soul to make it recall the knowledge it had acquired in its past lives.

How does learning relate to the soul? Plato clarifies this with a famous story about Socrates and the slave boy.

5.4 Geometry and past lives: Socrates

One day, Socrates visited his friend Meno. As they talked, Socrates mentioned a “glorious truth”—that a part of man is immortal and transcends death:⁶²

the soul of man is immortal, and at one time has an end which is termed dying, and at another time is born again, but is never destroyed.

From the experience of many past lives, the soul learnt almost all there was to know, Socrates continues:

The soul then... having been born again many times, and having seen all things that exist... has knowledge of them all.

If so, why don't we remember those past lives? The belief was that each time the soul is reborn, it forgets its past lives. (Why? We will see a reason for this belief in the next chapter.) But, continued Socrates, the soul could be made to recollect its knowledge from past lives by using the right method. This is just the process that people call "learning":

as... the soul has learned all things there is no difficulty in her eliciting or as men say learning, out of a single recollection all the rest... for all enquiry and all learning is but recollection.

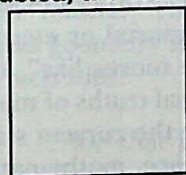
This, according to Socrates, was the real job of a philosopher or teacher: to assist in bringing out that knowledge that already existed inside each person, like a baby inside the mother.

Since Meno was sceptical about this theory, Socrates offered to give a little demonstration. He called one of Meno's slaves, a boy, and started asking the boy questions about mathematics. Socrates tells Meno to observe carefully that he is not teaching the boy, but only asking questions.⁶³ The boy does not seem to know much of mathematics and confidently makes some silly mistakes.

Socrates starts by drawing a picture of a square on the ground, and asks the boy if he knows what a square is.

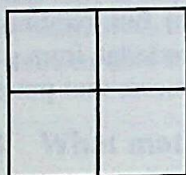


The boy says yes, he knows. Socrates then draws a square with double the side of the earlier square, and asks the boy what he thinks about the area of the bigger square. The boy says since the side has doubled, the area would also double!



After having thus pointed out the boy's ignorance of mathematics, Socrates then proceeds to question him again. At the next stage,

Socrates divides the bigger square into four smaller squares, each of which is the size of the original square.



The boy is perplexed, and starts doubting his earlier statement. Finally, the boy is able to arrive at the correct answer all by himself: when the side of the square is doubled, its area must increase fourfold.

Now, asks Socrates, did anyone ever teach this boy any mathematics?⁶⁴

Socrates: ... You must know about him if, as you say, he was born and bred in your house.

Meno: And I am certain that no one ever did teach him.

Socrates: And yet he has the knowledge?

Meno: The fact, Socrates, is undeniable.

Socrates: But if he did not acquire the knowledge in this life then he must have... learned it at some other time?

So, Socrates demonstrated that the boy had an intrinsic knowledge of mathematics, which could be elicited by a philosopher asking the appropriate questions. Socrates' argument was this: since the boy was untutored, this intrinsic knowledge could only have come from what his soul learnt in a previous life, and therefore he had an immortal soul!

Why was mathematics regarded as especially suited to arouse the soul? Proclus believed, like Plato, that mathematics incorporates eternal truths. He believed that the soul, too, is immortal or eternal. On the principle of sympathetic magic that "like moves like", the soul was hence sympathetically moved by the eternal truths of mathematics. Knowledge of other transient things like the current state of the weather did not have the same effect. Hence, mathematics was regarded as especially suited to move the soul, or, as men call it, learning.

5.5 Mathematics and virtue

These beliefs connecting mathematics to the soul were also closely related to the philosopher's concept of virtue. Socrates thought that people did bad things because they were ignorant—knowledge was all that was needed to make people virtuous. This knowledge was already inside people; all that the philosopher had to do was to elicit it, and bring it out of the person, like a midwife brings out a baby. As the science of learning, mathematics and geometry helped people to recall this innate knowledge, and thus become virtuous. Therefore, people could be made virtuous by teaching them mathematics (and music).

This plan of using mathematics (and music) to make people virtuous is made clear by Socrates in Plato's *Republic*. This dialogue presents Plato's visualisation of an ideal city-state called the "Republic". People in this city were to be made virtuous by transforming them internally, and not just by forcing them to obey laws.

People were to be transformed through education. Music and mathematics were the two key subjects in which the youth of the "Republic" were to be educated. Socrates explains the reason for this scheme through the beneficial effect it has on the soul. For music he says:

musical training is a more potent instrument than any other, because rhythm and harmony find their way into the inward places of the soul, on which they mightily fasten, imparting grace and making the soul of him who is rightly educated graceful... and... he who has received this true education of the inner being... receives into his soul the good, and becomes noble and good, [while] he will justly blame and hate the bad...⁶⁵

Socrates goes on to advocate the teaching of geometry for the same reason. The person with whom he is conversing, Glaucon, thinks geometry is to be taught for its military applications. Socrates corrects him:

...for that purpose a very little of either geometry or calculation will be enough; the question relates rather to the greater and more advanced part of geometry—whether that tends in any degree to make more easy the vision of

the idea of good...and compel[s] the soul to turn her gaze towards that place, where is the full perfection of being....⁶⁶

He asserts that learned people know that the right way to understand geometry is through its relation to the soul, although it seems contrary to the usual understanding of geometry. He goes on to decry the everyday speech of geometers as spreading wrong ideas about the subject, and reiterates that the real concern of geometry is the learning of eternal truths which attract the soul.

they confuse the necessities of geometry with those of daily life, whereas knowledge is the real object of the whole science.... the knowledge at which geometry aims is knowledge of the eternal, and not of aught perishing and transient.... geometry will draw the soul towards truth... nothing should be more sternly laid down than that the inhabitants of your fair city should by all means learn geometry.⁶⁷

5.6 The trial of Socrates

While mathematics was connected to virtue, it was *not* connected to science by Socrates. Although today it is claimed that secular science originated with the Greeks, the ironical fact is that in Athens people were deeply religious and scientific thought was deemed a crime. This comes out clearly in the trial of Socrates as described by Plato. Socrates wants the charges against him to be clarified.

[Socrates:] ... Do you mean that I do not believe in the godhead of the sun or moon like other men?

[Meletus:] I assure you, judges, that he does not, for he says that the sun is stone, and the moon is earth.⁶⁸

That is, Socrates is charged with the grave crime of scientific thought: the accusation against him is that he is *not* a religious person, and should be killed for that reason! This was the custom in Athens, for earlier on, another person, Anaxagoras, too was condemned to death for the same reason. Socrates defended himself against this accusation by saying that, unlike Anaxagoras, he was not concerned with physical speculations.

For the same reason, "Aristotle recalled the fate of Socrates and fled... declaring, 'I will not let the Athenians offend twice against philosophy' ".⁶⁹ *Science* could hardly have been produced in such a culture where any kind of scientific thought was punished with death.

That is, Greek philosophers naturally connected mathematics to religious beliefs, and not to science.

5.7 What happened to the religious view of geometry?

Plato's clear-cut views on the relation of geometry to religion raise a very interesting question which has not been asked by anyone till now. Today we teach mathematics as a secular subject, unrelated to any religious belief. We teach it because mathematics is regarded as useful for science. What happened to the religious view of geometry? How and when did it mysteriously vanish?

The answer should be clear to anyone who knows the story of the philosophers and the mystery religions which flourished in Alexandria.

6 The Mysteries of the Lovers of Sophia

The story of the first religious war begins in Alexandria, a great centre of learning.

6.1 The Great Library of Alexandria

Alexandria, the city of Serapis, located in the African continent, represented the fusion of Egyptian and Greek culture. Situated on a strategic sea route,⁷⁰ it was Alexander's final resting place in a gold sarcophagus on public display. It was also the scene of a famous love story: Cleopatra's fatal romance with Julius Caesar and Mark Antony. (Cleopatra was the last in the line of the Ptolemy dynasty which ruled Egypt.)

The pride of Alexandria was, of course, the grand temple of Serapis. But the source of the legendary Alexandrian learning was the huge library adjacent to it, possibly the Great Library of Alexandria itself, although some speculate that the bigger part of the Great Library's holdings were in the nearby temple of Muses or the Museum.

The Great Library had, according to its first catalogue prepared by Callimachus, at the time of Ptolemy II, some 500,000 books.⁷¹ Others, such as the 4th c. "pagan" historian Ammianus Marcellinus, have mentioned a figure of 700,000 volumes.⁷² However, the 5th c. Christian historian Orosius marked down this figure to 400,000 volumes. The very title of Orosius' book, *History Against the Pagans*, makes clear his aim to distort history. He saw false history as a tool to be used by the church in its war against non-Christians. Therefore, his figure must be regarded as the worst-case lower bound for estimates of books in the library.

6.2 Not out of Greece

Where did all these books come from? Avoiding this question has enabled historians to *suggest* that the books in the library were all somehow "Greek" books. But that seems impossible. Writing such a large number of scrolls would have required large quantities of papyrus, imported from Egypt at high cost. (The costs would have been high since international trade in those days was a very risky proposition.) Archaeological excavations have recovered very few papyri from Greece. This fact too goes against any such bulk imports of papyrus into Greece.

Since papyrus was fragile, the books would have had to be maintained and continually rewritten by scribes. Prior to Alexander's conquests, the Greek city states were too poor to afford and to sustain the vast army of leisured scribes needed to write and maintain a huge collection of papyri. While the Ionian Greeks had been colonised by Persia, other independent Greek city states were small outposts at the edge of the Persian empire.

They were small villages, more like tribal clans. From Plato's description of the trial of Socrates, we learn that Athens, one of the larger city states, had only some 600-odd citizens. *Hence* the affairs of the state could be run, like those of tribal clans, by a direct meeting of all citizens. Even assuming 10 slaves and women for each Athenian "citizen", the population of Athens did not exceed 6000 people, most of whom were illiterate.

Because these city states were engaged in frequent warfare, each citizen was required to do military duty. So even those 600-odd citizens had little time for learning, and there were no schools of higher learning. Most of the learned Greeks from Pythagoras to Plato acquired their learning by travelling to Egypt, much as people traveled to Cambridge for higher education during the days of the British empire, or they travel to Cambridge, US today. This situation continued until Plato who comes just a few years before Alexander.

The Roman historian Strabo corroborates that libraries were absent in Greece until the time of Alexander. He tells us that Aristotle (Alexander's teacher) was the first "man" to have a library—presumably by "man" Strabo meant "Greek", for the Egyptians and Persians, for example, did maintain libraries long before the Greeks. If there were no libraries in Greece, prior to Alexander, the books in the Great Library certainly could not have come from Greece.

Almost all Greek names worthy of note, and connected with "Hellenic" science—Eratosthenes, Archimedes, Hipparchus, and Claudius Ptolemy, for example, not to mention "Euclid"—relate to Alexandria, and not to Athens, because Athens discouraged science and learning, while the Great Library—this great resource and centre of learning—was situated in Alexandria, in the African continent.

So it seems that cause and effect have got confounded. Greek scholars were not the cause of the Great Library. Rather, the Great Library was the cause of the change in Greek culture between Athens and Alexandria.

6.3 The origin of the Great Library

At half a million volumes, the collection of books in the Alexandrian library was too large to have been produced by Greeks in Alexandria either. We have seen that Ptolemy I had an army of barely 4000 people, and that his reign lasted some thirty years, during most of which he was busy fighting. Even if Ptolemy's entire army magically changed from illiterate soldiers to scholars who laid down their weapons and started producing books on a war footing, they could not have produced all the books in the Alexandrian library in so short a time. The books, however, were in place by the time of Ptolemy II, and were catalogued by Callimachus. If the books in the Alexandrian library were not produced in Greece or by Greeks, where then did they come from?

Such a large collection of papyri could only have come from Alexander's war booty of books, from vaster and more ancient civilizations—Egypt and Persia—which produced these books over centuries and millennia. That would nicely explain the initial corpus of books in the library. We gather from Persian sources ("Kitab al Mawlid" or the Zoroastrian Book of Nativities) that Persian books, from the treasury of Darius, were indeed part of Alexander's war booty, and that he had some of them translated into Greek and the originals burnt. Indeed, these sources recount the great difficulty Persians had in preserving their heritage after Alexander's conquest, and the sack of Persepolis so glorified in Western history.

Presumably, a part of Alexander's war booty of books was sent on to Greece to be translated into Greek under the direction of Alexander's teacher, Aristotle. That would also nicely explain why Aristotle was the first "man" to have a library. Presumably also the larger part of

Alexander's booty of books, being so bulky, lay neglected in Alexandria. Ptolemy I, engaged in his petty battles, had little time for it. Unlike gold, silver and other valuables, books would have been of little concern to a general engaged in warfare.

Things settled down only towards the end of Ptolemy's reign, and people became aware of this treasure only after his death. Being under the control of a Greek king, some of these books would naturally have been translated into the Greek language.

Ptolemy II sought to enhance the vast collection of books: where Alexander had sought (vainly) to acquire all territories in the world, Ptolemy II sought to acquire all knowledge in the world. He issued an edict that ships entering the port would be searched for books, and any books found would be confiscated, although a copy would be delivered back to the original owner. To the collection of books from Persia, Babylon and Egypt already in Alexandria, Ptolemy II added books from other parts of the world. So, the Great Library of Alexandria was a stockpile of knowledge drawn from all over the world.

Ptolemy II was a contemporary of Ashoka the Great.⁷³ Ashoka sent a delegation of learned and wise men to Ptolemy, to spread medicinal plants, and to teach Dhamma (righteousness). Ashoka recorded the resulting "victory of Dharma" in rocks scattered across India and Afghanistan.⁷⁴ Though there is no record of the exact books carried by Ashoka's delegation, Indian thought was well known in Alexandria, from the time of its founding, and especially to Proclus' predecessors like Porphyry, and Plotinus, and to early Christians.

Ptolemy III continued the process of expanding the collection of books, and wrote to various kings to send him their books. Numerous books were translated into Greek in Alexandria: these included the Old Testament, which was translated from Hebrew to Greek. For this translation, 72 rabbis were reportedly employed. Hence, it is called the Septuagint (or 70), and we hear about it from the so-called "Letter of Aristeas" named after a Jewish scholar. (The current version of the letter appears to have been doctored, and cannot be considered reliable.)

6.4 Sophia and her lovers

There was a good reason for learned people to accumulate around the Great Library of Alexandria, for the books in the library were on

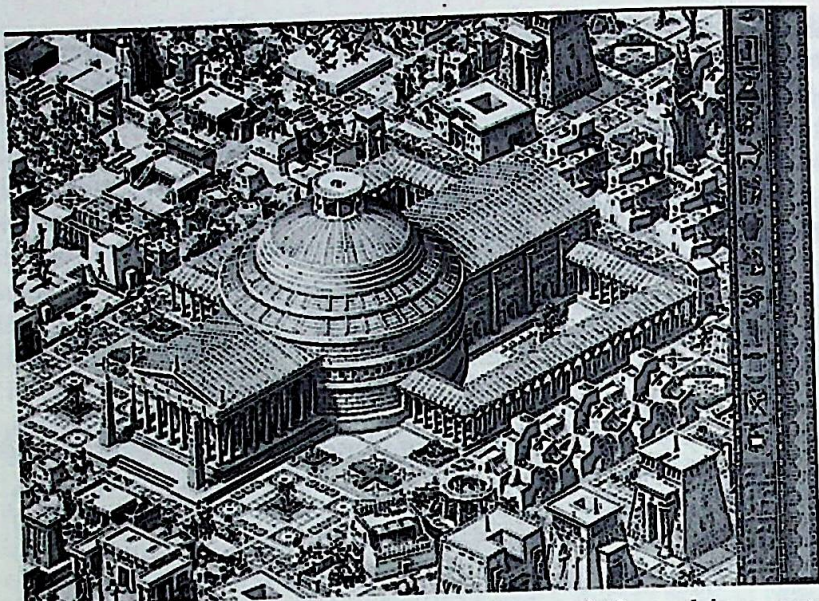


Figure 6.1: A visualization of the Great Library of Alexandria reported to have housed over half a million books.

papyri. Papyrus is brittle and gets easily damaged with use. So, unlike books in a modern library, it was a great challenge to preserve those books. Just maintaining the library required vast supplies of papyrus; to ensure those supplies, Ptolemy banned the export of papyrus. More importantly, just to preserve the Library it *had* to be associated with a large group of scribes and scholars and learned and wise men, who continuously copied out the books on fresh papyri.

And, more remarkable than what was inscribed on the papyri was what was inscribed in the minds of living men who passed through the great school of Alexandria associated with the Library. These were the lovers of Sophia—goddess of Wisdom—hence called “Philosophers”. (In Greek, “philo” means love.) These lovers of wisdom⁷⁵ included Origen—the most prominent exponent of early Christianity.

The learned and wise philosophers of Alexandria presented a complete contrast to the Athenian attitude. They advocated learning, and promoted the gathering of knowledge from all parts of the world, for they thought that learning promoted virtue. They regarded knowledge from all sources as equally valuable, for they did not think any one part of the world or any one set of people was superior to

others. They maintained that all people were equal, irrespective of the religion they believed in. The philosophers firmly upheld the value for which Ashoka had argued so eloquently in his rock edicts: that one must respect all religions, and not criticise a belief without good reason.

For the philosophers, this belief in equity was fundamental, for "equality... is the source of justice",⁷⁶ hence harmony in the cosmos. Their sacred spaces were inscribed with the statement: "Let no one enter who does not believe in equality and justice". The philosophers argued for equality on the grounds that each person had an immortal soul which was equally a part of the one Nous, it did not matter what god they worshipped.

Because many of the books in the Great Library originated from Egypt, the philosophers had to be adept with the mysterious and symbolic way of expressing religious thought which was used in Egypt.

6.5 The Egyptian Mysteries

Suppose one were to demand, in the frivolous manner of a modern-day TV quiz, "Describe the knowledge in all the books in the library in one line." What might that line be? The most important thing the books contained was: the secret of immortality. In ancient Egypt, ancient Persia, as in ancient India, and many other parts of the world, people believed they had found the secret of immortality.

However, as in ancient India, in Egypt too this knowledge was kept a secret. It was thought that this knowledge should be given only to those worthy of receiving it and not to all and sundry. Why? It was believed that if this knowledge fell into the wrong hands, it could be very destructive. (This was not very different from the present-day belief that knowledge of the atomic bomb could be very destructive if it falls in the wrong hands, and we will see what actually happened in this case.)

Now, briefly, there are two ways to keep a message secret. One is to lock it in the treasury, or conceal it on the person of the messenger. This way has its limitations, for if the treasury is looted, as Darius' treasury was, the secret is lost. If the messenger is intercepted, then also the message is lost. The other way to keep the message secret is to encrypt it. This is what we do with Internet banking today. Even if the message is intercepted, its contents are encrypted and remain a secret for it cannot be deciphered. Only a knowledgeable person who has

the key or the password can decrypt the message. Thus the message can be sent in a completely public way, for its contents remain secret.

This second way was used in ancient Egypt, and the secret of immortality (and knowledge of the soul and the ultimate nature of life and death) was protected by concealing it within an elaborate symbolism. As with any good system of cryptography, the symbols themselves constituted esoteric or outer knowledge which was not hidden and was available to all. The mysterious *meaning* of the symbols constituted esoteric or inner knowledge which required a secret key available only to the initiates who had proved worthy to receive this secret knowledge.

Consider, for example, the image of the Egyptian god Horus.



Figure 6.2: Horus on a lotus

Let us explain some of the symbolism here.⁷⁷ At the base there is the slime, which represents "everything of a corporeal nature or belonging to the realm of matter". Above this is the lotus plant which is regarded as something perfect, for "everything pertaining to the lotos, both the forms in the leaves and the appearance of the seed, is observed to be circular". Horus, "the one 'sitting above the lotus-blossom' expresses enigmatically an exaltation above the slime" or gross material concerns. The circle and snake above refer to "cyclic"

or rather quasi-cyclic time, over which Horus has achieved victory. This depicts the possibility of escape from quasi-cyclic time, and hence from re-birth and re-death.

This account of the "Egyptian Mysteries" is found in a long explanation given by Abammon the teacher in answer to various questions raised by the philosopher Porphyry. Similarly, Abammon explains⁷⁸ that "phallic images" are used to represent "the procreative power by conventional symbols", and that this is "an invocation to the generative energy of the universe".⁷⁹ On this understanding, the cosmos is sustained by creativity, which needs to be celebrated and encouraged. He also explains why the use of "immodest language" is ritually sanctioned (as in the Indian festival of Holi): to illustrate "the absence of moral virtues in the realm of matter." The point of using these symbols is this: "perceiving from the speaking of vile utterances, what is vile, they follow to the (divine) sources of the ideals.... They accordingly... turn aside from evil action."

He goes on to explain that symbols work by analogy and gives⁸⁰

another reason of analogous character for these customs. The powers of the human passions that are in us, when they are barred on every side, become more vehement: but when they are brought into activity with moderation and reasonable measure, they are sufficiently delighted and satisfied, and becoming pure in consequence, are won over and set at rest. In the same way, likewise, in comedy and tragedy [in drama], when we behold the emotions of others, we repress our own, make them more moderate and are purified from them. In the Sacred Rites, also, we are, by certain spectacles and relations of ugly things, delivered from the harm that is likely to befall through the events represented by them.

So, this sacred symbolism represented, like mathematics and geometry, an elaborate technique of healing the soul, although it was a technique which contrasted sharply with the later-day doctrine of sin, which misunderstood or misrepresented the symbolism involved, and classified those rites as sexual, hence sinful.

Sometimes these secret and sacred stories or Mysteries were inscribed in stone in the form of idols. Thus Porphyry wrote:

... images... sketch invisible things in visible forms... To those who have learned to read from statues as from books

I will show the things there written concerning the gods. Nor is it any wonder that the utterly unlearned regard the statues as wood and stone, just as also those who do not understand the written letters look upon... books as woven papyrus.

The association of the library with the temple was not accidental: knowledge and virtue were not two separate things. And indeed, in later times, many people, not understanding the symbolism involved, indiscriminately condemned idols and "idol worship". This is somewhat like condemning books (and burning them) as "paper worship".

6.6 The Greek Mysteries

As the quote from Porphyry suggests, Greeks too evolved a similar tradition, sometimes known as the Greek mysteries.

The story of Cupid and Psyche in Greek mythology is a mystery story of this sort. On the face of it, it is just an ordinary love story. This is the exoteric (or outer) meaning. The esoteric (or inner) meaning is that Cupid means love, and Psyche means soul. So the story is really about how love reunites the soul with God.

However, the Egyptian and Greek mystery traditions differed in some ways. In Egypt, the real meaning was told only to the initiates who went through a rigorous ritual and swore an oath of secrecy. Some Greeks like Herodotus who travelled to Egypt for higher learning, as was the custom among early Greeks, maintained this tradition. At some points in his description of Egypt in his *History*, Herodotus states that he knows something more but refrains from telling it because of his scruples—presumably the vow of secrecy to which the Egyptian priests had tied him.

However, with other Greeks, starting from Plato, key aspects of this secret knowledge were also made publicly available in books written in plain prose. Plato is naturally accused of having broken his vow of secrecy. We will see later on the consequences it led to. Probably these Greeks had no idea how thoroughly an organized religion could destroy the human conscience, bringing the world to the brink of disaster.

6.7 The popularity of the mysteries

The philosophers who helped to maintain the library were hugely popular, for everyone enjoyed those intriguing mystery stories. Something in those stories touched a deep-seated chord.

With the Roman conquest of Greece and then Egypt, by Julius Caesar, this mystery tradition spread throughout the Roman empire. Indeed, today a common way to caricature the pre-Christian Roman tradition (as in the "Asterix" series of comic books) is to point to their immense liking for Bacchanalian "orgies".

We can also understand this tradition from the way it continued into much later times (although the emphasis shifted from knowledge and learning to the purity of heart). For example, a long-drawn love story, or an erotic couplet from Omar Khayyam, might have a deeper hidden meaning as the story of the soul's quest for God and its ultimate reunion.

While this sort of thing is branded exotic and occult in the West, it is a very common aspect of the popular culture in India, say, even today. How wide a circulation these stories had can be judged, for example, from present-day popular Hindi cinema, which abounds in love stories and songs. Every Indian child, including the street urchin who does not know how to read and write, knows that the term for "love" is "mohabbat". However, this term is derived from the Arabic sufi (Sophia) tradition, and means the love of the soul for God! Romantic love was seen as a manifestation of the soul's longing to come together with God.

6.8 Cosmos and soul

Today the soul is thought of as something shadowy and metaphysical. But the early notion of the soul was a *physical* one,⁸¹ for it was based on a physical picture of the cosmos and of time as quasi-cyclic. The cosmos may or may not be like that, but whether it is like that is something that can be decided by means of experiments.

It was thought that the cosmos went through cycles, each cycle being roughly similar to the one preceding, like each routine day on earth is similar to the one preceding. This belief is found also in the Bhagvad Gita (8.17-20).

There is day also . . . and night in the universe . . . day dawns and all those lives that lay hidden asleep come forth and

show themselves... night falls, and all are dissolved... Thus they are seen, O Prince, and appear unceasingly, dissolving with the dark, and with day returning back to the new birth, new death⁸²

The serpent in the Horus figure is a cosmic symbol which refers to the cosmic cycle. One finds in the *The Egyptian Book of the Dead*: "I am the serpent Sata. I die and am born again each [cosmic] day. I die and am born again and... grow young each day."⁸³

The difference was that each cosmic cycle was thought to be of enormous duration: while a day and night on earth last for 86,400 seconds, a cycle of the cosmos (or a day and night of Brahmā as it is called in India) was thought to take 864,000,000 years.⁸⁴

Because each cosmic cycle was roughly similar to the one preceding, it was believed that people too were reborn in successive cycles of the cosmos, and lived roughly similar lives. It was hence believed that each person had an immortal soul which survived death, connecting similar people across cosmic cycles. Because time commences afresh, it is natural that memories commence afresh, so that people do not recall their past lives.

The secret of immortality, then, was not a way to overcome death once, but it was a way to overcome re-birth, hence re-death, *for ever*. This is precisely what is known as *mokṣa* or *nirvāṇa*. It is the most natural thing to want if the cosmos (and time) is indeed quasi-cyclic.

Whether time is indeed quasi-cyclic is another story. But nothing in the physics we know today rules out such a possibility as absurd. Quite to the contrary, a closed cosmos which obeys Newtonian physics (which the real world does not) must necessarily be quasi-cyclic.⁸⁵ This is also true of a closed cosmos in which the geodesic hypothesis of general relativity is valid.⁸⁶

6.9 The Jesus Mystery

As the Egyptian and Greek mysteries became popular and spread, this led to the proliferation of mystery cults in the Roman empire. Although the form of the story and the characters in it kept changing with the telling of the story, the inner meaning remained the same.

Christianity began as one such mystery religion in the Roman empire, and Christians were those who subscribed to the "Jesus mystery". The story of Jesus was a mystery with deep symbolic significance like the story of Bacchus; it was not intended to be interpreted literally. As

we have seen (p. 3), there is not much difference between the stories told about Horus or Bacchus and those about Jesus. As Bernal puts it, "Jesus was the Christian Osiris". Unlike real historical figures like Gautama Buddha or Paigambar Mohammed, Jesus is pure myth—a retold Egyptian myth, to be precise.

The Gregorian calendar contributes to the myth that Jesus was an actual historical figure born at the beginning of the Christian era. In fact, it was only during the calendar reform carried out by Dionysius Exiguus, in 536 CE, that the terminology of AD (*Anno Domini*, Year of our Lord) was introduced. The name BC (Before Christ) for dates before 1 AD came well after that. That is how the zero point of the Christian calendar came to be associated with the "birth of Jesus". The start of the Christian era was determined purely by a 6th c. arithmetical back-calculation, related to the date of Easter, and has no correlation with any historical event whatsoever. As such, it is difficult to say *exactly* when the Jesus mystery originated. Probably this cult began around the 2nd c. CE when we first hear of Christians from genuine Roman historical sources.

A special feature of the Jesus mystery was its association with an astrological belief about the Age of Pisces. Pisces is the sign of the fish in the zodiac. As Martin Bernal points out⁸⁷ fish are hardly mentioned in the Old Testament literature, while the New Testament literature abounds in references to fish. We saw that (p. 47) the Greek word for fish is *ichthys*, which was commonly read as an acrostic stating the belief in Jesus as saviour. Hence the sign of the fish was used as a secret sign by Christians to recognize other initiates. We saw the relevance of this to the first proposition of the *Elements*. Now, the beginning of the Age of Pisces cannot be sharply determined, and depends upon the way the constellations are demarcated, and there is naturally considerable ambiguity and difference of opinion regarding that. What is more important, therefore, is the *expectation* that historically prevailed in that time and place. The expectation was that the Age of Pisces would commence from 139 CE.⁸⁸

A decade ago, when the year 2000 was about to arrive on the Christian calendar, there were widespread fears about the imminent destruction of the world. Books on the prophecies of Nostradamus, claiming that the world would end in 1998, did brisk business. Newspapers regularly ran articles on the fears that people had. The dawning of the new Age of Pisces was similarly associated with the idea of widespread destruction, and the "glad tidings" of a saviour who would

save a select few from apocalyptic destruction. All this was meant to be interpreted symbolically, like the beginning of a new year, associated with Bacchanalian revelry. However, many people misunderstood the myth by interpreting it in literal terms. This misunderstanding became prominent as the cult later developed.

6.10 Early Christianity and Origen

Even a century later, in the 3rd c. CE, a view nearly identical to that of the philosophers was espoused in early Christianity, by its chief exponent: Origen of Alexandria. Origen was justly famed as the foremost Bible scholar of his times. He had prepared the Hexapla or 6-fold Bible which presented 6 different versions of the Bible side-by-side in 6 columns. This enabled easy comparison between different versions. The present-day English Bible derives from the Latin Vulgate, meant for the vulgar (or common) person. The Vulgate was prepared in the 5th c. CE by Jerome, who used Origen's notes from a couple of centuries earlier, and hailed him as an "immortal genius".

Origen taught that each person had a divine soul—a part of God—which went through a series of lives, before eventually reuniting with God. In broad outline, this belief was a very common belief in the ancient world: the Egyptians had similar beliefs, as did the Indians in Vedic times. Similar beliefs were the cornerstone of the way of life and the notion of virtue taught by the philosophers: a Hindu or a Sufi today would have only relatively minor philosophical differences with Origen.

Because this belief in "cyclic" time was later condemned by an important council of Christian priests (the Second Ecumenical Council), it became taboo in the West. Consequently, a vast amount of confusion today surrounds this belief in Western thought and literature, a confusion which has also crept into science.⁸⁹ But the idea behind this belief is simple enough: that the cosmos and time are quasi-cyclic, and that people are hence reborn in successive cycles of the cosmos.

Origen shared these beliefs about cosmos and soul. The word that Origen uses for cosmos is "world".⁹⁰ He sets out to investigate whether the world is unique, and asks:

whether there was any other world before the one which now exists; and if so, whether it was such as the present, or somewhat different. . . .⁹¹

He explains that the "world" is called an "age" by the scriptures which speak of a sequence of ages.

But this world, which is itself called an age, is said to be the conclusion of many ages.⁹²

He then claims that the scriptures also speak of future ages.

Now that after this age, which is said to be formed for the consummation of other ages, there will be other ages again to follow, we have clearly learned from Paul himself, who says, "That in the ages to come. . ."⁹³

Origen asks whether each world in this sequence of worlds is *exactly* like the preceding one, and rejects this possibility:

For if there is said to be a world similar in all respects (to the present), then it will come to pass that Adam and Eve will do the same things which they did before: there will be a second time the same deluge, and the same Moses will again lead a nation numbering nearly six hundred thousand out of Egypt; Judas will also a second time betray the Lord. . .⁹⁴

He rejects this possibility on the grounds that it goes against the freedom of the will:

and everything which has been done in this life will be said to be repeated—a state of things which I think cannot be established by any reasoning, if souls are actuated by freedom of will, and maintain either their advance or retrogression according to the power of their will. . . . So therefore it seems to me impossible for a world to be restored for the second time, with the same order and with the same amount of births, and deaths.⁹⁵

Origen, however, accepts the possibility of a sequence of worlds where things either progress or regress:

a diversity of worlds may exist so that the state of another world may be better [than this], and for others worse, and for others again intermediate. But what may be the

number or measure [of these worlds] I confess myself ignorant, although, if any one can tell it, I would gladly learn.⁹⁶

Origen's beliefs are similar to what is better known as the Hindu doctrine of *karma-samskāra*. According to this doctrine, the cosmos goes through a series of cycles, and people's actions (*karma*) in one cycle of the cosmos determine their dispositions (*samskāra*) in the next cycle. This doctrine has been widely held to be responsible for the inequity and injustice of the caste system. However, Origen used it to argue that Christianity believed in equity and justice.

Origen wrote that God believed in equity, since he had created all men equal.

He created all whom He made equal and alike, because there was in Himself no reason for producing variety and diversity.⁹⁷

All souls were together and one (hence equal) at the beginning of time, and all would be one (and equal) again at the end of time, which would be the same as its beginning.

For Origen, God's justice was not dispensed at the end of time. He thought the series of worlds had been created for the education of the soul. Therefore, Origen believed that God's justice was dispensed in this world, where people were rewarded or punished according to the merits of their actions in the previous world.

In which certainly every principle of equity is shown, while the inequality of circumstances [at birth] preserves the justice of a retribution according to merit.⁹⁸

In Origen's view, similar to, say, the Hindu view, heaven and hell were where people went *between* lives on this world. He did not think of hell as a horrible place, but rather as a reform school, while heaven was a college for the advanced education of souls.

In this way Origen combined within Christianity the belief in both equity and justice—the two principles that the learned philosophers of Alexandria held to be most important.

Thus, priests and philosophers lived in friendship and harmony in Alexandria in the 3rd c. CE.

7 The Altered Christian Doctrine

7.1 The council of Nicea

The fire crackled. A hush fell over the court as nearly 300 assembled bishops watched their lengthy epistles being burnt. These epistles contained a litany of complaints and grievances that they had submitted to the emperor Constantine. But Constantine was a warrior, not a scholar; he had instinctively understood that these complaints were full of falsehood, slander, and intrigue. Therefore, the emperor thought it necessary to demonstrate his open contempt for these falsehoods by publicly burning these documents as unread.⁹⁹

Constantine had called this meeting, in Nicea (in present-day Turkey), in 325 to bring about harmony among the worshippers of the cross. The cross, which had earlier been a symbol of love, had become for Constantine a symbol of military victory. A priest had convinced him that his victory over Maxentius at the Milvian bridge in Rome had been due not to his own military skill but to the symbol of the cross that he carried on his banner. That victory had made Constantine the unquestioned ruler of the Roman empire, so he had adopted the cross as his lucky mascot. (Constantine was the emperor of the Roman empire, and the Romans were notoriously superstitious people.)

7.2 The date of Easter

The key agenda of this Council of Nicea was simply to bring about harmony between the warring Christian factions, by fixing a common date for observing the rituals of the festival of Easter¹⁰⁰ or Pascha

as it was then called. Traditionally, Christians had celebrated this festival on the same day as the Jewish Passover. But many Christian bishops found this humiliating since this date was decided by the Great Sanhedrin or the supreme council of Jewish priests, who would declare the first day of the Jewish month, based on the sighting of the new moon. So, the Christian priests felt that this made them subordinate to the Jewish priests. To assert their independence from the authority of Jewish priests, some Christian priests wanted the Christian festival of Easter to be celebrated on a day different from that of the Jewish festival of Passover.

The desire to use separate rituals to establish a separate identity for the Christians was simple enough. But an unexpected difficulty presented itself. In that assembly of learned priests at the Council of Nicea, no one knew how to make a calendar! Of course, even Robinson Crusoe could mark the passage of days by cutting notches in a tree, but a different sort of calendar was needed to determine the date of Easter. The Robinson Crusoe calendar simply counted days, with each sunrise taken to mark a new day. But fixing the date of Easter was more complicated. Even today the Easter festival does not occur on a fixed day of the commonly used (Gregorian) calendar, such as 25 Dec. The date of Easter is "moveable" since it depends upon the phases of the moon.

So what was required was a calendar which would take into account also the phases of the moon, to enable a rule to be laid down for Easter. Now, a cycle of the moon lasts between 29 and 30 days, from whence the name "month" for a period of 30 days. But the calendar then used in the Roman empire was the Julian calendar, instituted by the Roman emperor Julius Caesar, and similar to the present-day Gregorian calendar (except for the rule about every hundredth year not being a leap year, etc.). It is well known that months on this calendar have no fixed length: for instance, July has 31 days in honour of Julius Caesar. This was the state of affairs after the vigorous calendar reforms instituted by Julius Caesar!

This shows that the Romans had long abandoned all attempts to correlate the months on their calendar with the phases of the moon. (The Greek calendar was even more inaccurate, and the Romans used "Greek calends" as a common witticism for confusion arising from its use.) So it came about that there was no one in that entire assembly of priests who could lay down a rule by which the date of Easter was to

be determined, for no one knew how to correlate the calendar with the phases of the moon.

So the issue was referred to the most learned and wise people in the Roman empire, the philosophers of Alexandria, for, at this time, the Christian bishops of the Roman empire had no quarrel with the philosophers of Alexandria.

7.3 The motive of state power

But things changed after the Council of Nicea. The cross, which was earlier a symbol of love, was confirmed as a symbol of military victory at Nicea. Christians now started referring derogatorily to non-Christians as "pagans"—meaning "civilians" or "rustic", hence non-combatants.

The change in the character of the cross changed also the character of the priest who represented the cross. As a result of Constantine's indulgence, many priests became very rich and powerful. Where Origen had lived a simple life, these priests started sporting ceremonial robes. In the words of the scientist Isaac Newton who studied this period very closely, the entire clergy became "covetous and ambitious":

It's plain therefore that not a few irregular persons, but ye whole clergy began at this time to be puft up, to set their hearts upon power and greatness more then upon piety & equity, to transgress their Pastoral office & exalt themselves...¹⁰¹

The priests who now lusted for power planned to capture it. Though Constantine did not turn Christian himself,¹⁰² he allowed one of his sons to convert to Christianity. The priests bided their time until Constantine's death, and then seized power in a swift coup in which all of Constantine's non-Christian sons were killed. Even Constantine, it was rumoured, had converted to Christianity moments before his death—and we have the word of a priest for that! Accordingly, Constantine's only remaining son, Constantius II, was installed as the first Christian emperor of Rome.

Though Constantius II was the emperor, his early training made him obedient to the priests who hence ruled by the back door, as advisors to the emperor. These ruler-priests now started consolidating their power by demanding complete subservience also from the subjects of the emperor—the people of the Roman empire. They started

dictating exactly what religious beliefs people could or could not hold. Anyone who dared to deviate ever so slightly was harshly punished with confiscation of property and exile—which in those days usually meant death in the wilderness. With each such punishment the priests grew richer with confiscated property, and also more powerful as their opponents diminished.

7.4 The Julian effect

But when Constantius II died, the next Roman emperor, Julian, promptly dethroned the priests. He restored the earlier Roman tradition of religious tolerance and rebuilt the libraries that had been burnt by the priests. Julian's regime of tolerance restored domicile even to the earlier exiled Christians, but did not accord to them any special sort of status in the Roman state. For this reason, Christian historians refer to him as "Julian the apostate".

Ironically, Julian was soon assassinated by the very people to whom he had restored domicile. On the rebound, these Christian hardliners seized power.¹⁰³ They renewed their attacks on "pagan" books and temples.

However, the priests were uneasy. Having captured power and lost it, they now realized that their hold on power was very insecure. A puppet emperor like Constantius II could go only so far. Another Julian might arise and again topple their rule. What could they do to prevent it? How could they perpetuate their rule? Rulers rule by striking terror in the hearts of the ruled. But what weapon did the priest have to perpetuate his rule? All he had was a doctrine of universal love which frightened no one.

Therefore, the Christian doctrine itself was refashioned into a weapon, by priests like Augustine. The new doctrine enabled the priest to strike superstitious terror in the hearts of simple people who believed what they were told. Where Origen's God was part of man, Augustine's God was a separate and powerful entity before whom all would be dragged from their graves on the day of judgment. And what a terrible punishment He would give to all those who disobeyed the priest!

For Origen, heaven and hell were temporary, where the soul went between lives in this world. Origen's God was an educator who rewarded and punished souls to continue their education in successive worlds. But Augustine's hell was everlasting. His God was an untiring

sadist who exacted eternal revenge with no future purpose in mind. The altered doctrine (post-Nicene Christianity) had the support of the powerful priests whose power it supported.

Inequity now became the pillar of the new Christian notion of justice. Origen had taught that all people were equally a part of God, for he thought the end of the world was the same as its beginning, where all would merge back into God. Christians received no special treatment. But, the priest now promised his followers that his god would treat Christians on a fundamentally different footing from non-Christians. Those who did not accept the authority of the priest—the non-Christians, derogatorily called “pagans”, “heathens”, etc.—he would send to hell, irrespective of how virtuous a life they may have led.

How deeply this terror of the priests penetrated the Christian psyche is clear from those sickening pictures painted by poets like Dante centuries later. (According to Dante,¹⁰⁴ the Christian god cast into hell and exacted eternal and vicious vengeance also from Paigambar Mohammed, the founder of Islam.) There is nothing “medieval” about these Christian beliefs in depraved forms of eternal torture, for the cold facts are that Gallup polls show that over 50% of people in the US still believe literally in this sort of heaven and hell.

While the priests certainly wanted people to convert to Christianity, they did not want people to believe that mere conversion to Christianity would ensure an automatic passage to heaven—the priest also wanted a handle to control those Christians who might be tempted to challenge his authority from within. To this end, Augustine introduced the doctrine of sin, which replaced the earlier Christian doctrine of love.

Origen had believed, like the philosophers before him, that virtue flowed automatically from knowledge—*learning* was all that was required to make all people perfectly virtuous. (Hence, his God was an educator.) In contrast, in the new Christian doctrine of Augustine, *fear* of God and of hell was the main reason to behave virtuously: “God-fearing” meant virtuous.

In practice, of course, “God-fearing” meant the same thing as “priest-fearing”. The doctrine of sin made explicit this relation between the two kinds of fear: virtue now meant the avoidance of sin, and it was the priest who decided what constituted “sin”, and had the power to offer indulgences to those who sinned.

To heighten the superstitious fear, Augustine came up with a strange view of the soul. In Origen's view the soul was repeatedly reborn in successive worlds; it got any number of opportunities to advance. In Augustine's view the soul got exactly one chance; it would be resurrected only once, after apocalypse, and would then stay (in bodily form) either in heaven or in hell for the rest of *eternity*. Thus, Augustine's God gave no one a second chance.¹⁰⁵ In a word, Augustine replaced Origen's notion of *reincarnation* (belief in a series of lives) with the notion of resurrection (belief in life after death exactly once). Simple people believed all this, and feared the anger of the priest, so that it made the priest an important figure in society.

To further heighten the fear, Augustine added a touch of urgency by interpreting the Bible literally. His god did not give people much time to decide: there was an urgency to repent now and be obedient to the priest, for Doomsday and divine vengeance was just round the corner (as it has been for the last 1600 years).¹⁰⁶

7.5 The changed Bible

One might wonder how two such different interpretations were possible of the same scripture from which both Origen and Augustine claimed support. The short answer is that the scriptures were substantially reinterpreted and reworked. Origen prepared the Hexapla to show how the 6 different versions of the Bible prevalent in his time differed from each other. These differences were presumably the natural sort of differences that arise in normal course—due to translations, differences in understanding, errors in transcribing, etc. This already gives an idea of how much a motivated reinterpretation can achieve.

The present-day Bible derives from the English translation of the Latin Vulgate, prepared by Jerome in the 5th c. Though Jerome had earlier praised Origen to high heavens, he later turned around 180° to join those whom he had earlier called "baying dogs" for criticizing Origen.

Now I find among the bad things written by Origen the following: that there are innumerable worlds, succeeding one another in eternal ages... that in restitution... Archangels and Angels, the devil, the demons and the souls of men whether Christian, Jews or Heathen will all be of one condition and degree [i.e., they too will be saved], and... we

who are now men may afterwards be born women, and one who is now a virgin may chance then to be a prostitute.¹⁰⁷

The pinch lies in the last two lines where Jerome has misrepresented Origen's entire concept of justice. Origen believed that people received their stations in lives according to the merits or demerits of their actions in previous lives, and not according to chance or accident.¹⁰⁸ This belief was the cornerstone of Origen's notion of justice. By introducing a single word, "chance", Jerome "skillfully" negated the foundations of Origen's beliefs.

Did Jerome apply similar "skills" to misrepresent and restate the Bible? The vast differences between different versions of the Bible became apparent in India in the 16th c. The earliest known versions of the Bible, in Aramaic, existed in India, with the Syrian Christian community. This community traces its origins to the legendary St Thomas, believed to be a disciple of Jesus, although the earliest actual historical records of Indian churches go back only to about the 8th c. CE.¹⁰⁹

When the Portuguese arrived in India, in the 16th c., they set up the first Roman Catholic mission in 1500 in Cochin, close to this large Syrian Christian community. They soon discovered that their own Latin version of the Bible was vastly different from the Aramaic version used in India. Eventually, in 1599, Bishop Menezes of Goa called the so-called Synod of Diamper (Udayamperoor). Having tricked the Indian bishops into parting with their handwritten Bibles, he proceeded to make a bonfire of them. In this way, most of the earliest Aramaic Bibles from India were destroyed.

But many honest scholars still managed to piece together the evidence of the changes in the Bible. Isaac Newton, the scientist famous for "Newton's laws", made a deep study over 50 years of the alterations in the Bible during this period before and after Constantine. He wrote the results of his researches in an 8-volume *History of the Church*. We gather some scattered fragments of his scholarship from his handwritten notes which have become available more recently. He examined 1 John 5:7 in his Bible and noted its reinterpretation:

It is not read thus in the Syrian Bible... Not by Ignatius, Justin, Irenaeus, Tertull. Origen, Athanas. Nazianzen Didym Chrysostom, Hilarius, Augustine, Beda, and others. Perhaps Jerome is the first who reads it thus.¹¹⁰

Newton thought that the true Christian doctrine had been corrupted by what he called the "fals[e] infernal religion". Distressed with the manipulation of the Bible, in his notes, he roundly abused the priests who had brought about this change, calling them "spiritual fornicators", and the "most wicked wretched sort of people... the worst sort of men that ever reigned upon the face of [the] earth".¹¹¹

However, it was the priests who had the last laugh. During his lifetime, Newton dared not publish his work for fear of the priests. After his death, Newton's lifework on how the Bible was distorted was suppressed as "foul papers relating to church matters" and "not fit to be printed". It has remained suppressed for the nearly three centuries that have elapsed since Newton's death.¹¹² In 1998, the Imperial College in London started a Newton project which aimed to try to collect together some of these suppressed Newton manuscripts. This project is still going on, and the key manuscripts still remain unavailable: although their location is known, the owners of these manuscripts refuse to part with them.

In this way, evidence of the numerous changes made to the Bible has been either destroyed or suppressed down to our times.

7.6 The politics of hatred

This changed Christian doctrine fanned the politics of hatred. While early Christianity was a doctrine of love, altered Christianity became a doctrine of hate. What God did to non-Christians in hell was what the "God-fearing" and virtuous people ought to be doing to them on earth. So, the Christian priests imitated their newly designed God and demonstrated their virtuousness by creating hell for all non-Christians on earth! A religious war was unleashed against the "pagans"¹¹³ in the Roman empire.

This religious war became especially vicious in Alexandria, where the philosophers resisted the priests by writing books giving reasoned arguments against the new doctrines. Since the priests could not respond to the arguments of the philosophers, they attacked them physically. "Pagan" temples were indiscriminately destroyed, pagan lands seized, and their customs suppressed.

Many Christian kings in the Roman empire ordered the burning of books.

In the year 363 or 364 Emperor Jovian... professed Christianity. As a document of his earnestness, he burned in

the city of Antioch a library of pagan books. . . . The angry Antiochenes watched while all the books of the collection went up in smoke.¹¹⁴

The good work was continued by Emperor Valens who in 371 ordered books in Antioch to be seized from private houses and destroyed—declaring the possession of earlier law books to be unlawful.

7.7 The end of the Great Library

The philosophers resisted these changes. Some ridiculed the Christian priests for spreading superstitions by interpreting mysteries literally.

Referring to Mark 16:18, Porphyry writes: "In another passage Jesus says: 'These signs shall witness to those who believe: they shall lay hands on the sick and they shall recover. And if they drink any deadly drug, it will hurt them in no way.' Well then: the proper thing to do would be to use this process as a test for those aspiring to be priests, bishops or church officers. A deadly drug should be put in front of them and [only] those who survive drinking it should be elevated in the ranks [of the church].

If there are those who refuse to submit to such a test, they may as well admit that they do not believe in the things that Jesus said. For if it is a doctrine of [Christian] faith that men can survive being poisoned or heal the sick at will, then the believer who does not do such things either does not believe them, or else believes them so feebly that he may as well not believe them."¹¹⁵

As the leader of the Christian priests in Alexandria, Theophilus was stung by his inability to answer. He *knew* well enough that he would die if he took poison—irrespective of what the scriptures might say. But if people stopped believing in the literal truth of the scriptures, he would lose his power over them. He fretted and fumed, and the only response he could think of was to attack the philosophers physically. But he did not want to expose himself to any risk in the process. Theophilus wrote a letter to the Roman emperor in Constantinople, asking for permission to destroy the temples in Alexandria. He received no reply or was refused: the Roman state, perpetually busy in wars with its neighbours, still had some elements

of sanity left, and was reluctant to have further civil strife on its hands. Theophilus repeated his requests a few times, with similar results.

Eventually, either on his own initiative, or egged on by other church leaders, and with the help of a possibly forged¹¹⁶ document, Theophilus assembled a mob—a veritable army of soldiers and former soldiers—and marched on the temple of Serapis (Chapter 1).

: : :

The historian Gibbon admitted that the Great Library was burnt during this very attack on the temple of Serapis:¹¹⁷

The valuable library of Alexandria was pillaged or destroyed; and near twenty years afterwards, the appearance of the empty shelves excited the regret and indignation of every spectator whose mind was not totally darkened by religious prejudice.

Christian apologists today vehemently deny that a Christian mob was responsible for burning down the Great Library of Alexandria. However, this denial is done in ways that are patently absurd.

One canard proceeds on the stock priestly technique of slander, and blames Caliph Omar for having burnt down the library. But Caliph Omar captured Alexandria long after it had been reduced to a ghost of its former self. At this time there were no books left in Alexandria. There could not have been. For, certainly, a Christian mob smashed the temple of Serapis; why would it have spared the Great Library? And if some books did survive, they would have been salvaged by the philosophers who had abandoned Alexandria long ago.

The historian Gibbon makes two further points. First, he points out that Christian sources refer to the library in the *past* tense;¹¹⁸ therefore, the charge against Omar is clearly one they well know to be false. Secondly, he points out that burning books was against Islamic injunctions.¹¹⁹ We do know of some instances when these injunctions were followed: for example, when Mohammed the Conqueror conquered Constantinople (Istanbul) in 1452, he did not burn its large library. Since there was no injunction against the selling of books, many of these books were sold, leading to a wave of Greek books arriving in Europe.

However, there were no such injunctions against the burning of books in Christianity. To the contrary, as we have seen (p. 82), Christian kings in the Roman empire repeatedly ordered the burning of

books. In fact, Christian priests continued to burn books up to the 17th c. CE, as in the incident of Bible burning in India ordered by a Portuguese bishop (p. 81).

Given this systematic Christian practice of book burning, how could the Great Library have survived until the days of Caliph Omar? Even if it somehow survived the attack on the temple of Serapis, for what reason would the library have been subsequently spared by the priests, contrary to the orders of numerous Christian emperors to burn pagan books? Who maintained the books under these circumstances? Obviously there are no satisfactory answers to these questions.

The other tack that has been tried is that the library was burnt by a fire which started during the invasion of Alexandria by Julius Caesar. Now it can hardly be denied that *some* fire might have broken out at *some* time in *some* place in Alexandria (which incidentally had a system of fire tenders even in those days). But why should we correlate this random fire with the library? Is it not far more likely that the library went up in flames under the attacks by the Christians who specifically targeted books?

This canard about Julius Caesar seems to have been first planted by Orosius in his *History Against the Pagans*. Orosius' idea was to falsify history to portray pagans in a poor light. He advocated telling lies in the service of the church. So, in all likelihood this was a falsehood invented by him as an apologia, presumably because Christians were greatly criticised for their act of burning the precious library.

Secondly, it should be noted that all these apologies are only directed against the burning of a *single* library—the Great Library of Alexandria—by a Christian mob; but there were so many other libraries and a vast number of other books in the Roman empire that were indubitably burnt by Christians, both before and after the emperor Julian. Why do we need a different hypothesis for the Great Library of Alexandria?

Finally, even supposing that some part of the library was burnt down at the time of Julius Caesar, wouldn't it have been rebuilt? For example, Gibbon points out that Marc Antony gifted 200,000 volumes to Cleopatra.¹²⁰

And what about the people in the school associated with the library? If the library got burnt at the time of Julius Caesar, what did they do? Did these lovers of Sophia simply pack up and leave?

8 Mathematics and the First Religious War

Since the philosophers did not pack up and quit, the priests renewed their attacks. This conflict between philosophers and priests was ignited by changes in Christian doctrine. The key issue was the notion of the soul. Today we would relate it to ideas about time and the cosmos.

The philosophers' idea of the soul involved a belief in past and future lives. The reincarnations took place in successive cycles of the cosmos (or successive ages of the world). Early Christians had shared these beliefs.

But the altered Christian doctrine altered the notion of the soul. The priests denied the philosophers' beliefs about time and cosmos, and they denied past lives, for they maintained that the cosmos was created a few thousand years ago. They admitted only a single future life, and insisted that the cosmos would soon end, and everyone would be brought back to life (resurrected, in the flesh) to be judged before god, and then confined to heaven and hell for an eternity.

Christian priests characteristically tried to settle this conflict through abuse, misrepresentation, and physical violence. For example, they described the philosophers and their followers derogatorily as "pagans" or villagers, as they still do to this day. The new Christian doctrine was founded on a misrepresentation of Origen.¹²¹ The abuse of "idolatry" was used to justify physical violence and physically destroy all "pagan" temples and idols in the Roman empire. This was the first religious war known to humanity, so one could say Christian priests invented religious war.

How did the philosophers respond? It is well to recognize that the two parties in this conflict had somewhat different goals, and used different means.

The philosophers' concern was with truth, not power or propaganda. They were not trying to sell a belief system to the maximum number of people. And abuse, misrepresentation, historical falsehoods, and physical attacks were all utterly useless for the purpose of establishing the truth. In fact, on the Indian rules of debate, one who abuses or misrepresents is immediately deemed to have lost the debate.

Therefore, the philosophers used other means. Today, we would turn to physics to settle the truth about the nature of time and the cosmos. The philosophers turned to mathematics and its mysterious significance.

If we discard that spurious passage about "Euclid", the rest of Proclus' prologue reads very differently—as differently as the original understanding of the Bible as a mystery differs from its present-day literal understanding. Indeed, if we take seriously the account of the *Elements* given by Proclus, the book sounds like a point by point refutation of the altered Christian doctrine.

8.1 Cosmic recurrence

Mathematics as the science of learning (mathesis) involved the belief that each person had an immortal soul, which had gone through numerous past lives. It was believed that people forgot their past lives at birth; hence Proclus refers to "our forgetfulness from birth". It was believed that mathematics helped to stir the soul from its slumber, and to remind it of the knowledge it had acquired in past lives. On the Platonic doctrine ("all learning is recollection") mathematics, by helping people to learn, also made them virtuous. Hence, Plato, in his conception of the ideal state, the *Republic*, explicitly advocated that young men should be taught mathematics to make them virtuous.¹²²

This early belief in past lives and the soul involved the view (also held by Origen) that the entire cosmos went through a series of cycles. Like the periodic return of the seasons, it was believed that each state in the cosmos recurred repeatedly.

People were thought to be reborn just because events in the cosmos *approximately* repeated. Thus, in this view, rebirth took place, not immediately after death, but in successive cycles of the cosmos. Unlike seasons which repeat each year, it was thought that each cycle of the cosmos took an enormous amount of time—around 10 billion years.

So, people were thought to be reborn not immediately after death, but a long time after death.

Of course, at the level of personal experience the long gap between death and rebirth makes not the slightest difference. The philosopher Friedrich Nietzsche eloquently clarified that one would not be conscious of this enormous duration:

You fancy that you will have a long rest before your second birth takes place,—but do not deceive yourselves! Between your last moment of consciousness and the first ray of the dawn of your new life no time will elapse,—as a flash of lightning will the space go by, even though living creatures think it is billions of years, and are not even able to reckon it. Timelessness and immediate re-birth are compatible....¹²³

Because this belief was contrary to the altered Christian doctrine, it has been persistently ridiculed and misrepresented in the West, for centuries. Therefore, it is better to clarify that there is nothing unscientific about the belief in a recurrent cosmos, and the cosmos may well be like that. In fact, under some fairly general conditions, according to present-day physics, the cosmos *must* undergo recurrence. In a finite universe evolving according to Newton's laws, for example, every state of the cosmos *must* approximately recur, with probability 1, according to Poincaré's recurrence theorem.¹²⁴ A more interesting type of recurrence (called quasi-cyclic time) is possible, with what I have called a "tilt in the arrow of time".¹²⁵ Such recurrence need be neither exact nor eternal. We do not know whether, *in fact*, the cosmos is recurrent, but it could well be.

8.2 Past lives vs creationism

Early Christian teachers, like Origen, had no difficulty in accepting this picture of the cosmos. Origen only emphasized that each cycle of the cosmos was not *exactly* like the preceding one, but that some worlds were better, and others were worse. However, his views were misrepresented. The priests (such as Augustine) claimed that Origen advocated eternal and exact recurrence, so that Jesus would be repeatedly crucified, and be unable to save humanity. They used this misrepresentation to reject Origen and curse him. Subsequently,

Westerners have invariably confounded any kind of recurrence with exact or eternal recurrence.

The real reasons why the later-day Christian priests objected to a recurrent cosmos were many.¹²⁶ One key reason had to do with the church doctrine of creation. The belief in past lives required a belief in a cosmos that had existed for eternity or at least a long time. This might lead people to reject the creation story—and that deprived the priest of an important source of power. God as creator of the cosmos was proclaimed its owner, and that made the priest, the representative of that God, the real owner.

Augustine justified the belief in the short life of the world on the basis of the scriptures,¹²⁷ “reckoning by the sacred writings, we find that not 6000 years have yet passed”. Later theologians refined this, and the date of creation was put at -4004 CE, on Sunday, 23 October, according to the famous date provided by Bishop Ussher in the 17th c. CE. With exquisite scholarship, the time of creation was further sharpened to 9 a.m. on that date by Sir John Lightfoot, Vice-Chancellor of the University of Cambridge.¹²⁸ The first page of the 888 CE manuscript of the *Elements* says that it was copied by one Stephen, clericus, in the year of the world 6397, which is *hence* taken to be 888 CE.¹²⁹

The doctrine of creation is something the church regarded, and still regards, as fundamental. But the issue in those days was taken a lot more seriously than the creationist controversy about the teaching of biological evolution in US schools today. Moreover, the fundamentalists then had complete control over the state, unlike the partial control they have today. Anyway, the persistent importance of creationism to the priests, from that date until now, is clear enough.

Thus, the philosopher's understanding of mathematics, as a technique to help learning, by inducing the soul to remember its past lives, went against this key creationist doctrine of the priests.

8.3 Eternity vs apocalypse

Augustine, the key theologian of the state-church, emphasized not only that the world was young, but that it would soon end: that the apocalypse (the end of the world or the day of judgment, when the Christian God would judge all souls, sending some to heaven and others to hell) was just round the corner. This was probably a critical

belief for Christianity when it started with the end of the astrological Age of Aries and the beginning of the Age of Pisces.

Augustine also redesigned heaven and hell to suit the carrot-and-stick policy of the priests. It was an important source of power for a Christian priest to be able to arouse fear by saying, "Repent: for the end of the world is near." (Even after 1500 years, this policy still works: it is noticeable how the scare about the end of the world peaked a few years ago, at the end of the second millennium.)

We have seen that this was *not* the belief in early Christianity. Origen thought that the world would come to an end only after an immense period of time in the future. In Hindu mythology, this period of time is some 200 billion years. People do not fear events that are so unimaginably remote.

But even 200 billion years is nothing compared to eternity. And philosophers like Proclus argued that mathematics could embody eternal truths just because the cosmos itself existed eternally. But *that* meant (as Buddhists believed) that the cosmos was uncreated and would have no end—putting an end to stories about the day of judgment. Proclus wrote a book *On the Eternity of the World* giving some eighteen arguments to this effect.¹³⁰ Proclus' notion of the soul, like Origen's, was related to the notion of "cyclic" time. What is the relation between "cyclic" time and the eternity of the soul? Proclus explains this in *his* book *Elements*, nowadays also called *Elements of Theology*.¹³¹

Thus, Proclus' understanding of mathematics, as incorporating eternal truths, entailed an eternal cosmos in direct conflict with the "end-of-the-world-is-near" fear of apocalypse the priests wanted to peddle.

The church retaliated. In 529 CE, Justinian declared Proclus a heretic, and instituted a law to put heretics to death. In the same year, the Christian theologian John Philoponus responded with a book called *On the Eternity of the World: Against Proclus*, defending the Christian view of apocalypse and a short-lived world against the views of Proclus.

Belief in previous lives and an eternal cosmos were not the only points of conflict between philosophers and the church. Proclus' prologue presents the *Elements* as a deep and clever book, in the mystery tradition, which refutes point-by-point various other key elements of the new Christian doctrine as re-formulated by priests like Augustine

in the 4th c. CE. Specifically, on the Proclavian interpretation the *Elements* advocates immanence, equity, and images.

8.4 Images, idols, and geometric figures

The Christian priests who had violently torn down temples, and images of the “pagan” Gods, justified their actions by accusing the “pagans” of “idolatry”. Why is it such a bad thing to make images in stone? We have seen (p. 67) that the philosopher Porphyry explained in his book *On Images* how images made invisible things visible, how statues are like books written in stone, and only the “utterly unlearned” would regard a statue as a piece of stone, like they might think of a book as woven papyrus. However, the Christian emperor Theodosius had singled out for burning the works of Porphyry, who also wrote a book called *Against Christianity*:

We order to be committed to the fire all the writings that Porphyry, impelled by his own madness, or any one else, has composed against the holy Christian religion, no matter in whose possession the books are found. For all the books that move God to wrath and that harm the soul we do not want to have come even to men’s hearing.¹³²

Every known text of the *Elements* liberally uses images familiar to school children as geometric figures. These figures are not *essential* to prove the propositions in the *Elements*. However, geometric figures are *helpful*, a useful learning aid. Proclus understood learning as a process in which the soul remembered the knowledge of its past lives. So, Proclus said images helped learning, just *because* they served to stir the soul.

as Plato also remarks: “If you take a person to a diagram,” he says, “then you can show most clearly that learning is recollection.” That is why Socrates in the *Meno* uses this kind of argument [draws a diagram] to prove that learning is nothing but the mind’s remembering its own ideas.¹³³

As we have seen, the first figure in the *Elements* is the fish figure. This suggests that, though the tradition of geometry it embodies is an old one, the book *Elements* in the form in which it has come down to us was specially addressed to Christians, who, at that time, used the fish figure as their mysterious symbol.

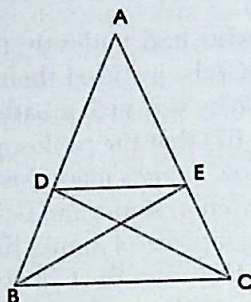


Figure 8.1: According to Proclus, images serve to stir the soul. He meant that images make learning easier. This image is a geometric figure which goes with the fifth proposition of the *Elements*, which shows that the angles at the base of an isosceles triangle are equal, and that if the equal straight lines constituting the sides of the triangle are produced, the angles under the base are also equal. The figure is easier to understand than the verbal proposition.

8.5 Immanence: finding God inside man

The new ruler-priests claimed to represent a God bigger and more powerful than all other gods: increasing the power of their God increased the power of priests as representatives of that God. In fact, a different thought almost cannot be expressed any longer, for this belief is today built into the very syntax of the English language: the Christian God *must* be written with a big "G", while the pagan gods *must* be written with a small "g"! This God—the one with a capital "G"—was to be feared, for he sat in judgment on man.

Briefly, we describe such a God as transcendent (God outside man). This notion was in contrast to the earlier notion of God among both philosophers and Christians, which was immanent (God inside man).

For Proclus, the soul residing within man was part of Nous, so the way to the soul was also the way to Nous. (Origen described this by saying that God is *in* all.) Proclus thought mathematics, as the science of learning, by putting a person into an introspective and meditative state, showed the way to the soul and also the Nous inside man.

Looking inside oneself was not regarded as an easy task mainly because the constant inputs from the senses keep one's attention riveted to the outside world. This difficulty is eased by mathematics, as Proclus explains. The joy of doing mathematics, like the joy of flying a kite, is something that must be experienced to be understood. Children flying a kite are commonly known to get so absorbed in it that they sometimes fall off the roof. Likewise, in the process of doing mathematics, the student gets so absorbed that he completely forgets about the outside world. Thus, Proclus explains, mathematics takes away the student's attention from the external world, directs the student's attention inwards, and thus helps him reunite with Nous.

This realization of the soul as one and equal to the Nous was regarded as the ultimate goal of life, similar to *mokṣa* or the union of *ātman* with *Brhman* in Hinduism, or to *nirvāṇa* in Buddhism. To reiterate the previous quote:

[mathematics]... fills everything with divine reason, moves our souls towards Nous, ...turns us back on ourselves... and through the discovery of pure Nous leads us to the blessed life.

Proclus points out that the aim of his *Commentary on the Elements* is to bring out this neglected aspect of mathematics.

If one had only to look inside oneself to find God, all one needed was a teacher, a guru: this is what sufi-s, for example, still believe today. Thus, mathematics, as understood by Proclus, hit a vital interest of the priests by making irrelevant the entire hierarchy of ruler-priests who brokered salvation with God.

8.6 Equity

We saw that the philosophers' belief in immanence related to equity: people were equal because they were parts of a single entity. Recognition of this equity was regarded as the source of justice and harmony

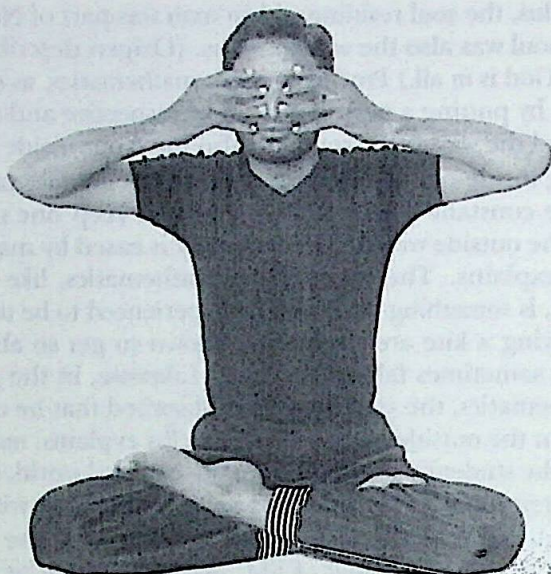


Figure 8.2: A yogic posture to block external sensations by covering the eyes, ears, nose, and tongue, to help turn the mind inwards. Just as yoga is commonly misunderstood as a form of physical exercise, Proclus argued that practical applications were only a side-effect of mathematics, and the real aim was to help turn the mind inwards. “Yoga” means union, the union of *ātman* (“soul”) with *Brhman* (“God”), so that the aim of yoga, like that of Proclus’ mathematics, is to enable the soul to find and unite with the “God” within.

in the cosmos. On the other hand, the ruler-priests advocated a transcendent God whose “justice” was based on a fundamental inequity between Christians and non-Christians.

The belief in equity was another anti-Christian belief incorporated in the (original) *Elements*. Almost every proposition in the *Elements* is about *equality*—the equality of things that are superficially different. Each proposition is, thus, like a mystery story: only the outward or exoteric meaning is about angles and triangles. The inner or esoteric meaning is about the equality of beings who are superficially different—for example, because they have different religious beliefs. (Instead of the word “equality”, modern geometry texts use the word “congruence” suggested by the mathematician David Hilbert in the late 19th/early 20th c. CE, so don’t be surprised if you don’t find

the word "equality" in a school geometry text, for the texts have changed.¹³⁴) Specifically, most propositions of the *Elements* are thus like the mystery story about there being no royal road to geometry.

Recall the story about some geometer telling a king that there is "no royal road to geometry". Though the king and the commoner seem very different, these differences are superficial, and both are ultimately equal, in the sense that their souls are equal. So, when the king marches on the road to ultimate truth, by studying geometry, he must discard superficial external appearances, and recognize this fundamental equality. Hence, there is no royal road to geometry, because geometry demonstrates equity.

8.7 Summary of mathematics as religion

As clearly explained by Proclus, the mathematics of the *Elements* quite explicitly promotes and propagates all those key elements of religious belief condemned by the state-church: previous lives versus creationism, an eternal cosmos versus apocalypse, immanence versus transcendence, equity versus inequity, images versus condemnation of idolatry. These were exactly those elements that were at the dead centre of the horrifying religious war the Christian priests waged against the philosophers in Alexandria, exactly the elements that were cursed and savagely attacked by those priests for centuries to come. Exactly those elements that were regarded by them as critical to acquire and retain a stranglehold over power.

9 Hypatia

We can now understand the reasons for the wrath of the priests. In their quest for power, the Christian priests had changed the Christian doctrine from a doctrine of love to a doctrine of fear and hate. The common people were too illiterate and too frightened to oppose the priests: the strongest opposition the Christian priests encountered in this process was from the philosophers of Alexandria who were concerned with truth, not power. So, the priests were not satisfied with the destruction of temples, and the burning of books. For, although the temple of Serapis and the books of the Great Library of Alexandria were destroyed, the philosophers lived on.

9.1 Hypatia's resolve

To lead the resistance to the priests, there sprang up on Alexandrian soil a brilliant philosopher, Hypatia. Daughter of the last head of the Alexandrian school, she learnt mathematics from her father Theon of Alexandria. This was the same Theon who referred to *his* edition of the *Elements*, without once mentioning any Euclid!¹³⁵ This is the same Theon whose name appears in all except one Greek manuscript of the *Elements*.¹³⁶

Absorbing mathematics from her father had made Hypatia an accomplished mathematician, and most probably the real author of the "received" version of the *Elements*. Hypatia was also a woman of great and striking beauty, and even greater wisdom—the very embodiment of the goddess Sophia.

We have no truthful account of what happened next, for the written accounts that have come down to us are all from the viewpoint of the Christian priests. This is rather like describing a rape and murder from the viewpoint¹³⁷ of the rapist and the murderer on the grounds

that there is no other reliable source of evidence. The victim is obviously dead, and the written records have been burnt, but we can still piece together what must have happened, as in the following fictional reconstruction from Hypatia's viewpoint.

Hypatia watched as her father Theon lay dying. She did not grieve. She was too benumbed and overwhelmed by the recent events. What a grand figure of authority he had been! Only one who never appealed to authority, but always only to reason. Always so very kind and loving. Here he lay, completely broken and helpless.

She had only a hazy recollection of what happened. On hearing that the temple had been abandoned, she had asked about Theon. Getting no reply, she had run all the way. Though there was no one swifter than her in Alexandria, she reached too late. The wild, uncouth crowd of Christians had entered the sacred precincts of the library shouting obscenities, although it was clearly written outside that only those who believed in equity and justice should enter. Theon had emerged to face them. As always for the last two years he was carrying with him a scroll of the Elements he had been working on for some time. How frail he had looked in front of that unruly crowd! He tried to reason with them in his usual way. But they would not listen to him. The crowd pushed him aside. As he fell, the scroll slipped out of his hands. Someone in the crowd, perhaps the leader of the Christians called Theophilus, had kicked the scroll. As Theon's hands moved to grasp the precious scroll, the man had stamped on Theon's fingers, breaking them. What a strange way of showing his love of God!

She had pulled Theon to safety and had tended to his fingers lovingly, using all the skills of healing she had learnt from him. But it was no use; something had broken inside. The library—the precious library—to which he had devoted all his life had in a moment been reduced to ashes. His soul, shocked by what it had seen and experienced in this world, seemed all prepared to leave his body. She suppressed a sob. Hadn't he taught her that death, like life, was a transitory thing?

But she felt sad. Sad for Theon. Sad for those untutored Christian souls who had been whipped into such a frenzy of hatred and destruction by their cunning priests—undoubtedly the priests were the worst of souls, who would take the longest to return to the truth, blinded as they were by their lust for power. What could she do?

Obvious. Teach them. Teach the Christians—for they lacked virtue because they lacked knowledge. But how to penetrate that hard oyster shell of prejudice which the priests used to trap the souls of common folk? Mathematics would be her knife. With

it she would pry open the hard shell of prejudice. Mathematics, the science of learning. Mathematics, the science of the soul, the science that Theon had so lovingly taught her. Mathematics, the science that would help the soul to emerge from its shell in all its lustrous brilliance.

She remembered with a sigh the story of Socrates and the slave boy. How well she had liked the story, and how she had made him tell it to her again and again. A faint smile came on her lips as she recalled, how, despite all of Theon's admonitions, she could never resist a giggle at the silly mistake the boy had made so confidently.

Why, she had asked, did Socrates choose to ask questions about mathematics, and not some other kind of learning? And Theon had gravely explained that the word for learning is *mathesis*, so that mathematics means the "science of learning" or the recollection of the eternal ideas in the soul.

Yes, she, Hypatia, would teach mathematics to the Christians. When they felt the stirrings of the soul within themselves would they not understand that the soul had gone through many past lives? From this knowledge within themselves they would know that the cosmos had existed for innumerable ages, and they would then know that the Christian scriptures were wrong to say that the cosmos was created only a short while ago.

Theon opened his mouth, as if to say something. But all that came out was a choking sound. Hypatia rushed to his side. His eyes were glazed. She felt for his pulse, but could not feel it. Why hadn't she learnt this art better? She felt again. Then, she gently closed his eyes.

She did not know how long she stayed bent over him. But then she became aware that there were other people around her. She sensed an undercurrent of anger. But anger was hardly an emotion befitting a philosopher. Nobody spoke much, as they quietly made arrangements for the cremation. As they came out of the house, she saw that there was quite a large crowd outside. But they had lost their leader. Who, she wondered, would be their next leader? There was no one fit enough, especially in a time of such great crisis.

As she walked behind the bier, Hypatia remained sunk in thought. What a strange custom the priests had taught to the Christians, she thought—of burying their dead. They promised the people that the Christian god would raise them from the dead "in the flesh", and so they ought to preserve the body. Didn't it strike the people that a god who could perform the miracle of reconstructing a decomposed and worm-eaten body could more easily construct the body afresh from the four elements? Didn't

they understand that the body was intrinsically perishable, and that it was the soul which lasted eternally? Yes, she would teach them mathematics. Through mathematics they would learn about their soul—that the soul remembered eternal truths just because the soul itself was eternal. And having learnt, they would stop fearing death and stop believing in the ridiculous superstition that the priests had taught them, that their bodies would by some miracle be made everlasting by their god.

And their god! What a strange and unjust god who did not respect the equality of souls! If the world were ruled by such an unjust god, how could the cosmos maintain its harmony—it would fall apart! Yes, she would teach them mathematics. The most elementary lesson in mathematics would teach them the equality of beings that are superficially different. They would come to recognize the equality of all souls. They would recognize equity as the basis of justice and harmony in the cosmos.

They had reached the cremation ground. A pile of wood was ready. The bier was gently laid on it, and the body was covered with wood. Someone was chanting a song to speed the soul on its way. She closed her eyes and lit the pyre. Then she sat down to watch.

As the flames danced and leapt high, she saw so many figures in them. Images. Yes, she would teach them mathematics. The geometrical figures would stir their souls, and teach them the value of images. They would learn to read the stories in idols like stories in books. They would then learn not to break idols or burn books. . . .

9.2 The Christian response

There were no temples left, but Hypatia walked on the streets of Alexandria, and debated with people at the street corners. Soon her fame spread. Crowds thronged about her house to hear her discourses. Once again, the leaders of the Christian church smarted under the bite of the arguments, and had no answers to offer. Once again, they decided that force was their only answer to learned arguments. The Christian bishop of Alexandria at that time was Cyril, a nephew of Theophilus. He gathered a mob. . . .

What followed was so horrifying that it shocked into a semblance of truth even some Christian historians, committed as they were to providing fully propagandist accounts of history. The mob descended on Hypatia, and carried her off to the church. Her clothes were torn

off her body, she was laid on the altar. The Christians valued virginity, and they had heard that she was a virgin. She was for sure not going to remain one by the time they were finished with her. Cyril had perhaps reserved this as a task to which he would personally attend. When they had finished, the skin was scraped from her body using tiles torn from the rooftops. After that her limbs were torn to pieces, and strewn all over the city. Cyril, too, was declared a saint.

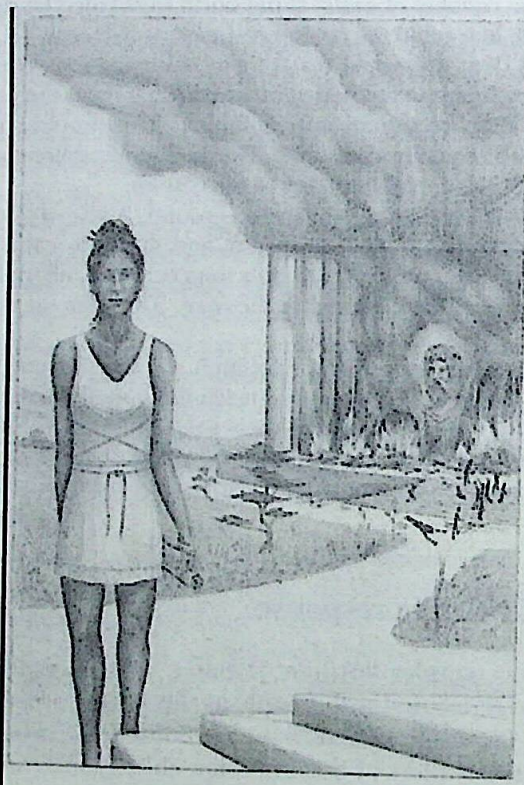


Figure 9.1: An image of Hypatia, daughter of Theon, an accomplished mathematician and philosopher who was torn to pieces in a church by a Christian mob. In the background is the Great Library of Alexandria burnt down when Hypatia was very young.

"After this," writes Bertrand Russell,¹³⁸ "Alexandria was no longer troubled by philosophers."

9.3 The successor: Proclus

But that is not entirely true: the burning of books continued unabated under orders from Christian emperors. In 435 CE and again in 448 CE the emperors Theodosius and Valentinian commanded the burning of books by official decree.

At the same time, we also know of at least one more prominent philosopher of the Alexandrian school—Proclus, allegedly the sole reliable source of information about “Euclid”. Proclus was nicknamed “Diadochus” meaning “the successor”. Having succeeded to the leadership of a school against which there was such a history of Christian violence and persecution, supported by the Roman state, what did Proclus do?

Presumably to escape being lynched, like Hypatia, or having his books burned, like Porphyry, Proclus appears to have left Alexandria at some stage. To preserve a heritage that was so violently being destroyed by the Christian church, and to preserve an understanding that seemed about to be lost, Proclus would naturally have addressed himself to preserving what he regarded as *most* valuable.

It, therefore, made good sense for Proclus to write a commentary on the *Elements* understood as an articulation of mystery geometry.

This naturally suggests that in Proclus’ time the *Elements* was of recent vintage.¹³⁹ We have seen that this is corroborated by the archaeological evidence of the geometry papyri from Alexandria: those papyri show that the *Elements* was *not* standardised until the 3rd c. Also, we have seen that the Greek manuscripts of the *Elements* tell us that they are based on the lectures of Theon, and *hence* were written shortly after Theon (or just before Proclus).

Apart from this, there is the peculiar fact that Proclus speaks only of “the author of the *Elements*” without telling us *who* the author is, though he happily names numerous other authors. What exactly prevents Proclus from telling us who the author was? It is clear that the issue involved is not one of religious scruple, for Proclus, like Plato, makes explicit the mysterious inner meaning of geometry. Why then the mystery about the author? Is it that he knew that the author was a woman, whose name he does not want to reveal? If that woman’s name was Hypatia, that would nicely explain Proclus’ insistence upon this anonymous mode of address, since he had to address a hostile Christian audience. In fact, we do not have a better explanation as of now.

9.4 The end of philosophy in the Roman empire

Shortly after Proclus' death, the emperor Justinian, in 529 CE, issued a formal edict shutting down all schools of philosophy in the Roman empire.

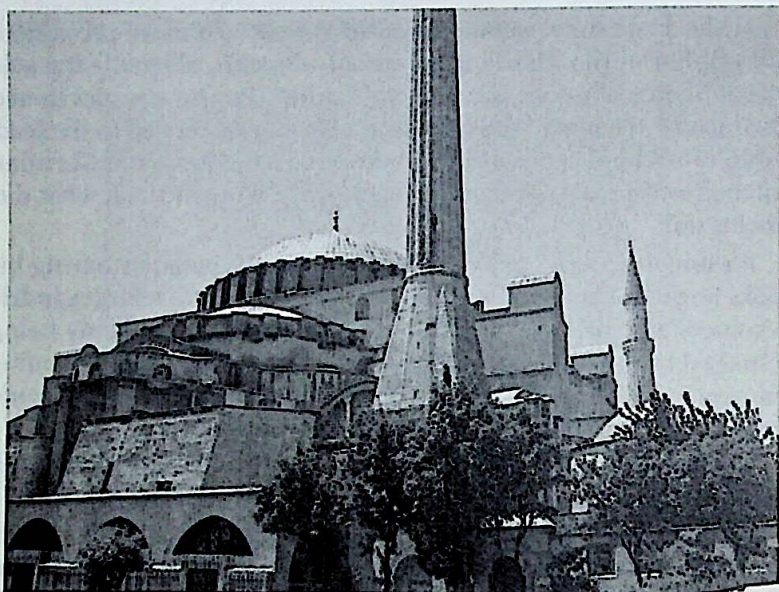


Figure 9.2: Hagia Sophia in Istanbul, where the curse on cyclic time was pronounced by the fifth ecumenical council, approving the altered Christian doctrine.

A few years later, Justinian also attacked the challenge to church power from early Christian beliefs. To this end, he summoned a key council of the church, called the 5th Ecumenical Council, and pronounced a great curse on Origen and his followers.¹⁴⁰ Called the anathemas against pre-existence, these curses of the priest forbade people from believing in earlier lives. One of these curses specifically prohibited people from believing that the souls of men were like geometric spheres, the one equal to the other. Ironically, these curses were pronounced in the church called Hagia Sophia in Constantinople, probably rebuilt on the remnants of a former temple to Sophia! Philosophy and mathematics thus came to an end in the Roman empire. The Dark Age had begun.

10 The New Alexandrias: Jundishapur and Baghdad

With their temples destroyed, their books burnt, and their schools and teachings outlawed in the Roman empire, the philosophers were compelled either to convert to Christianity or to leave the Roman empire, under pain of death. Left homeless and without any means of livelihood, what were they to do? Where were they to go?

The philosopher Simplicius stared gloomily at the waters of the Tigris as he thought about how to respond to the priest John. What rankled Simplicius was the unfair way these Christian priests propagated their lies after muzzling their opponent. It was to preserve their lies that the priests had destroyed all the philosophers' books and images, for knowledge immediately unmasks untruth. The priests had killed Hypatia, and desecrated the memory of the gentle Proclus, after his death, for explaining how mathematics led to eternal truths. The priests used all means to defend their lies: for those lies were the source of the priest's power. It was through those lies that the priests trapped simple people in their net, by promising eternal inequity, an eternity in which their God would favour those obedient to the priest. Couldn't people see that such inequity was a sure sign of an unjust god? Anyway he was happy he was almost in the land of Mazdak where equity was valued. Anyone who had heard the story of Mazdak knew that.

10.1 The story of Mazdak

Mazdak was a wise philosopher of Persia whose teachings had swept the land. The change this brought about has often been compared with the French revolution; that is not entirely appropriate, if only because there was no guillotine, for Mazdak was a pacifist and a vegetarian—teachings perhaps picked up from Buddhists (who had

earlier been chased out of Persia by the Zoroastrian clergy—called the Magi). Mazdak too invited the wrath of the Zoroastrian clergy whom he staunchly opposed, managing to shut down all except three Fire Temples.

Mazdak also invited the wrath of the Persian nobles for his teaching of equity. Being something of a utopian communist, he taught that private property was the source of inequity, hence the source of all evil. It all started simply enough.

Once there was a great famine. Everyone in King Kobad's court talked only of bread and water, but no one knew what to do.

Mazdak told the people, "Have no fear, our Shah will find a solution." He went to the king's court, and sought permission to put a question to the king. "Sire, if a man were bitten by a snake, and another man who has an antidote sees this and does nothing; and, if the first man were to die of the snake bite, what ought to be done to the second man?" "Well," said the king, "the second man is a murderer, and he should be hanged for it."

Mazdak saluted the king and went away. Outside there was a large assembly of hungry people waiting eagerly to know what had transpired. Mazdak told them to be patient and to wait until the next day. The next day in court he again sought permission to put a question. This time he asked, "If a strong man were to be put into fetters, and the man who had so bound him were to allow him to die for want of bread, would one say that the second man is wise?" "Decidedly not!" replied the king. "He is no more than a murderer." Mazdak again saluted the king and left.

Outside he told the assembly of hungry people, "Go to all the granaries whether they belong to the king or to nobles, and take from them all the food that you need. If someone stops you, tell them Mazdak told you to do so and he has the permission of the king." A storm of people soon broke into the granaries, and started seizing the grain. The guards tried to stop them, but upon hearing that this was ordered by the king through Mazdak, they rushed to the king to complain against Mazdak. The king summoned Mazdak.

In his defence, Mazdak stated that he was only following what the king had said. The people were dying of hunger, and there was enough food in the granaries to feed them. So the nobles who withheld food from the poor were no more than murderers. The aristocrats who thronged the court were shocked, and they looked at the king expectantly. But the king understood, and had nothing to say.

In those days, the custom in India and Persia was that a person defeated in argument became a disciple of the person who defeated him. Accordingly, the king became a disciple of Mazdak. The aristocracy was very unhappy because Mazdak's teaching of equity meant that people could seize their lands, and even walk into their homes and share their comforts. They could do little, for the king himself was on the side of Mazdak.

Mazdak was tumultuously supported by hundreds of thousands of people, and hailed as a prophet, for he himself lived a simple life. People practised Mazdak's teachings about equity as they applied to private property—they seized the vast lands of the nobles, demanding that all land be distributed equally.¹⁴¹

Naturally the Persian nobility and the clergy (Magi) made Mazdak into a hate-figure. They managed to depose Kobad and locked him in isolation, in the "Castle of Oblivion". In his place, his brother Jamasp was appointed king in 496 CE. However, given the pressure of public opinion, Jamasp also embraced Mazdakism, and within four years Kobad had managed to escape from oblivion and return as king. Although Kobad toned down his support for Mazdakism, he remained a strong advocate of equity. The future of Mazdakism looked promising, since Kobad was now old, and his eldest son openly sided with the Mazdakists.

10.2 The return of the philosophers

So it was towards neighbouring Persia that some of the lovers of Sophia had turned.¹⁴² Naturally, they carried with them the remnants of their most precious worldly possessions—their books—to save them from further destruction at the hands of Christian priests. So, ironically, some of the books that had been carried off in cartloads by Alexander's soldiers journeyed back to Persia on the backs of philosophers!

When the philosophers landed near Ctesiphon, the Persian capital, the first thing they did was to enquire about Mazdak and where he lived. They received no answer, and the person they had asked hurried ahead as if frightened. They asked another, and another and received similar evasive responses. Ultimately an old man dragged them to one side. "Haven't you heard?" he asked.

King Kobad, who was over eighty years old, had died. A war of succession had ensued, in which Kobad's younger son Khusrau had emerged the victor. Kobad's eldest son had been killed along with Mazdak and other key supporters of his.

10.3 At the king's court

The philosophers were now unsure of what reception awaited them at the king's court. What added to their uncertainty was that at this time the Persian empire was at war with the Roman empire in Byzantium. Unlike the Roman empire, the Persian empire was not a theocracy. Here people of various religions, including Christianity, coexisted. But in a time of war there is a tendency to suspect visitors from the enemy camp, just as every Muslim is today suspected in the West as a potential Islamic terrorist—and an air ticket is exhibited as proof of terrorist intentions! Would the king treat them as spies and put them to death?

But it was useless to dither now, having come all this way, and there was nowhere else to go. So it was towards Khusrau's court that the refugee philosophers bravely made their way, marvelling at the twists and turns of destiny. Khusrau received them with respect, and bade their leader to tell their story.

Having heard their story, Khusrau consulted with his courtiers. Some raised fears that they were spies from Rome. Others feared that their teachings might spark religious dissent and disturb the religious harmony of the Persian empire. Having heard both sides, Khusrau announced his decision. They would have to go and live in Jundishapur, a city started as a garrison¹⁴³ which had many Roman slaves, captured during the war, many of whom were Christians. This would take care of any fears that they were Roman spies. Moreover, they must do nothing to disturb religious harmony, nothing which was not agreeable to all religions.

Khusrau gave the philosophers a day's time to think things over. It was clear they could not build a new temple or a school to propagate their teachings. So what could they do? The philosophers conferred among themselves. Someone recalled how Ashoka's emissaries to Alexandria had carried medicinal plants "for both men and animals". This gave them a bright idea. The next day they appeared in court, and their leader announced that the conditions were acceptable. The philosophers would not open any temple in Jundishapur. Instead they would open a hospital. No one knew what a hospital was, and the philosophers explained that they would use their knowledge of medicine to treat sick people of all religions, and would also give them shelter and food till such time that they recovered. Everyone applauded the thought, and King Khusrau immediately announced a grant from his treasury to help the philosophers with their new project.

The great practical importance of their knowledge of medicine gained the philosophers quick acceptance, and the hospital at Jundishapur soon became famous. It later became a model for modern-day hospitals, though that model has been greatly corrupted, being dominated today by the greed for money rather than the philosophers' idea of service to humanity. The model of medicine started at Jundishapur came to be known as Unani, meaning Ionian, for the Ionian Greeks were a Persian colony, so that the Persians referred to Greeks as Ionians. (But Greece never had such a hospital.) This Unani system of medicine, which survives to this day, has strong similarities with the traditional Indian medical system of Ayurveda, which also travelled to Jundishapur. The philosophers saw healing as a mysterious creative process, so they believed one must tend not only to the body but also to the soul.

Did the philosophers' new-found preoccupation with medicine mean an end to their quest for knowledge? Not at all. The clear connection between medicine and knowledge (which persisted especially among subsequent Islamic philosophers as we will see) can be readily understood by anyone who has heard the story of Burzoe.

10.4 The story of Burzoe and the *Pañcatantra*

Soon the philosophers sent the king a strange present: a book from India, which spoke of strange medicine. The king asked Burzoe,¹⁴⁴ a physician in his court, to read it and tell him about it. Burzoe read the book and found it hard to believe that there could be such a medicine. But the thought of it wouldn't give him any rest.

At last he went to the Shah and spoke to him thus: "Your Majesty, I have read this book of the Hindus in which it says that on a mountain in Hind there grows a certain herb (the *sanjivani būṭi* of which one hears in the Rāmāyaṇa) which glistens like Greek satin. It is gathered by persons familiar with it, and is mingled into a compound by the application of science. When sprinkled over a corpse, the corpse is immediately restored to life. With your Majesty's leave I wish to undertake the arduous journey to Hindostan so that I may track down this marvellous herb."¹⁴⁵

The king immediately agreed, and equipped Burzoe for the journey. He also wrote out a letter to the Raay (Raja) of India requesting him to assist the physician in his search, and signed it with his royal seal.¹⁴⁶ (According to Firdausi, the Raja had previously sent to the

Shah a gift, a chessboard, and Khusrau had found the game of chess a very interesting way to clarify his thoughts about military strategy.)

The Indian Raja received Burzoe with all honour, and put a group of knowledgeable physicians at his disposal. Unlike Hanuman in the Rāmāyaṇa, Burzoe could not carry away the whole mountain. But, in the company of these physicians, he traversed the mountains arduously on foot. On his way he gathered every kind of herb whether dry or fresh, whether young or withered. He scattered every kind of herb singly and mixed together on corpses, but no corpse ever came back to life!

... it seemed that their magic powers had evaporated. His heart was disturbed by the thoughts of the king's displeasure, of the anger of the nobles and anticipation of the travails of the road. Also he regretted those valuable gifts he had presented, and was wounded by the thought that the reports which he had heard were vain.¹⁴⁷

So, Burzoe turned to his companion physicians and asked who was the most learned physician they knew.

With one voice they answered, "There is an ancient sage who lives nearby and who surpasses us in both years and wisdom." They guided Burzoe to this man who was seated on the ground, deep in contemplation outside a small hut.

The company saluted the sage, and Burzoe laid out all his travails before him. The sage listened in silence, and at last he spoke.¹⁴⁸

"I too have found this thing in books," he said, "and have moved eagerly, led by the same hopes. When nothing came to light after all my travails, I had perforce to listen to a different interpretation. The herb is the scientist; science is the mountain, everlastingly out of the reach of the multitude. The corpse is the man without knowledge, for the uninstructed man is everywhere lifeless. Through knowledge man becomes revived. ... In the king's treasury there is a book which the well-qualified call Kalila [*Pañcalantra*]. When people become weary of their ignorance, the herb for them is Kalila, knowledge being the mountain. If you seek this book in the king's treasury you will find it, and it will be your guide to knowledge."¹⁴⁹

Burzoe rejoiced upon hearing this, and thanking the sage he immediately returned to the Raja and begged that he be allowed to see the book, which he copied out along with a number of other Indian books, as he says in the preface to his translation.¹⁵⁰

Today the *Pañcalantra* fables are popular with children. However, then the animal fables in the *Pañcalantra* were regarded as useful for education, especially of kings—to impart to them a sense of justice, as was their original design. For example, there is the story of Brahmin and the mongoose, where the Brahmin mistakenly suspects the loyal mongoose and kills him. This has the moral that a king must not act rashly in haste. Similarly the game of chess was regarded as useful to teach people strategy or long-term thought.

10.5 Medicine and astronomy

The medicine in Jundishapur was linked to knowledge of various other things, like astronomy. Today, few people would connect medicine to astronomy. However, at that time people believed that there was a fundamental connection between astrology and medicine, and this can be found to this day in some traditional systems of medicine, such as the Tibetan system.

The study of medicine at Jundishapur was accompanied by the study of astronomy. Astronomy texts were imported from India, and translated as *zij-i-Shahryar*. There was some kind of astronomical observatory at Jundishapur.

10.6 The Golden Age of Persia

In this way, Khusrau continued the Alexandrian tradition of accumulating knowledge from diverse sources. As Khusrau's title Noshirvan (meaning "immortal soul") suggests, he was not only a great patron of knowledge but also accepted that it is only through knowledge that virtue and immortality can be attained. His other title was Khusrau the Just, signifying that he valued justice. That he also valued equity is clear from the fact that he did not undo what Mazdak had done, and did not restore to nobles the various lands that people had seized, but instead started an alternative system of land-ownership. Historians like Herodotus would say that it was his inclination for philosophy which made Khusrau I one of the greatest of Persian kings, who is still fondly remembered today. In any case, the prevalence of equity and

justice, and the high value placed on knowledge and virtue made his reign (531–79 CE) the Golden Age of Persia.

Khusrau's successor, Khusrau II, was also known as a patron of culture. Following in the footsteps of his illustrious predecessor, he continued to support the activity of the philosophers in Jundishapur. But barely five years after the death of Khusrau II, the Arabs conquered Persia. Although they left untouched the hospital and astronomical observatory at Jundishapur, they no longer supported them at the same level. Knowledge languished.

10.7 Baghdad

We saw earlier (p. 23) that military conquest in one direction often corresponds to a cultural conquest in the other direction, as in the case of Alexander. Similarly, although the Arabs militarily conquered Persia, this soon saw Persian culture flowing into Arabs. This flow increased with the rise of the Abbasid Caliphate which relied on Khurasan in Persia as its military backbone. The Abbasid Caliphate shifted its capital to Baghdad, a short distance from the old Persian capital of Ctesiphon. An astrologer from Jundishapur, an Nawbhakt, helped Khalifa al Mansur lay the foundations of Baghdad.¹⁵¹

Then, one day, Khalifa al Mansur had an affliction which no one could cure. Physicians were called from far and wide. But it was a *hakim* from Jundishapur, Jibrail, who successfully treated the Khalifa. Though Jibrail went back to Jundishapur, his reputation remained behind. The philosophers had come to be known as *hakim*-s—a word which means both a man of medicine and a wise man (as in the word “doctor”, which means both a medical doctor and a PhD).

At this time the tradition of gathering knowledge again picked up, and many books were translated from Persian (Pahlavi) to Arabic. One such book was the *Pañcalantra*, translated by Ibn Muqaffa around 750 CE. He gave a moral ending to the story which originally ends in the victory of the crafty Damnaka, and the destruction of the bull Sanjeevika. In Ibn Muqaffa's ending, a council is called the next day, and Damnaka is condemned and killed, so that truth does triumph.

Another key impetus for the translation came from the Barmakids. The word “Barmak” is a distortion of *pramukh*, meaning “head”—the Barmakids were heads of a Buddhist monastery in Persia. The Barmakids helped in the formation of the Abbasid Caliphate. Their influence in the later half of the 8th c. CE is clear from the fact that

coins were struck in the name of Khalid ibn Barmak around 760. His son Yahya ibn Barmak was influential with the next Khalifa, al Mahdi, and was tutor to the legendary Haroun al Rashid.

When al Mahdi fell ill, a *hakim* from Jundishapur, Jibrail's son Bukhtyishu, was again invited. He also attended to Yahya, but again went back due to various palace intrigues. Eventually, his son Jibrail became court physician to Haroun al Rashid. It is reported that Yahya ibn Barmak also invited Indian doctors to Baghdad, and had a number of Indian books on medicine translated at this time. An Indian book on astronomy, perhaps the *Siddhant* of Brahmagupta, was translated into Arabic as the *Sindhind* around 750 CE by Ibrahim al Fazari together with Yaqub ibn Tariq.

Yahya's son Jafar was a companion and later vazir to Haroun al Rashid. That the process of gathering knowledge was well underway at this time is attested to by the occurrence of these two as characters in the tales of the *Hazar Afsaney* (Thousand Stories), translated from Persian into Arabic at this time as *Alif Laila* (Thousand Nights) and today known as the *Arabian Nights*. This "translation" of *Arabian Nights* obviously must have been done well before 803 CE when Jafar was executed, and the Barmakid family was disgraced. Haroun al Rashid and Jafar appear as characters in various tales of the *Arabian Nights*, the tale of the Barber's sixth brother, or that of the boy judge. One of the stories, "Barmakid's feast", has one of these as the key character.

The patronage of the Khalifas created a great demand for the *hakim*-s of Jundishapur in the new centre of power at Baghdad.

The *hakim*-s who moved to Baghdad resumed their activity of spreading virtue by spreading knowledge. We have seen that both al Mansur and Haroun al Rashid encouraged the philosophers to import books and translate them into Arabic. According to al Nadim, a bookseller of Baghdad from the late 10th c. CE, it was in the time of Khalifa Haroun al Rashid that the *Elements* was first translated into Arabic by al Hajjaj. Al Nadim, however, does not tell us what the source of the *Elements* was, whether Pahlavi or Syriac.

10.8 The theology of reason in Islam

By the time of the next Khalifa, al Mamun, there was a crisis due to a schism in Islam. The problem related to the interpretation of the Koran. How to interpret those passages in the Koran whose meaning was *not* self-evident? This was a matter of immediate practical

importance, because Islamic judges relied upon the Koran for an understanding of how to dispense justice (jurisprudence, *fiqh*). Passages from the Koran were cited in support of, or against, someone up for trial. Disagreement over the meaning of the passages meant that the judge could not reach a judgment, or that the judgment was widely felt to be unjust.

Of the two contending groups, one was of the traditionalists who believed in interpreting the Koran literally. The opposing group, called the Mu'tazilah, argued that the relevant passages in the Koran must be understood intelligently, by applying the faculty of *aql* (intelligence or reason). The Mu'tazilah argued that the faculty of intelligence (*aql*) had been given to man to be used; hence it must be used also to understand passages in the Koran whose meaning was not transparent. This is in contrast to its opposite term *naql*, which commonly means (mindless) imitation, blind obedience to tradition, etc.¹⁵² Hence the traditionalists were called *naqli* or imitators. The beliefs of the Mu'tazilah came to be known as the *aql-i-kalam*, the theology of reason.

The word Mu'tazilah literally means "separatists" or "back-turners", and they were so called because the founder Wasil ibn 'Ata (80/699–131/748) turned his back on his teacher, al Basra. However, the Mu'tazilah described themselves as the People of Unity and Justice, since their two cardinal principles were unity (*tauhid*, oneness with Allah) and justice (*'adl*). Since unity relates to immanence, hence equity, we recognize these two as the same as the principles of equity and justice that were espoused by philosophers. From these two principles of unity and justice, the Mu'tazilah used reason to deduce a variety of theological consequences, in the manner of Proclus' *Elements of Theology*.

10.9 The House of Wisdom

Khalifa al Mamun was an ardent Mu'tazilite, and wanted to promote this school of thought. His mother was Persian, and he had grown up, like Haroun al Rashid, in Khurasan, in Persia, where he later became governor. Al Mamun, though he imprisoned Jibrail II as a supporter of his brother, certainly knew a bit about the history of Jundishapur, and this was the model he decided to emulate. He founded the Bayt al Hikma (House of Wisdom) in Baghdad, along the lines of the school at Jundishapur. A variety of books were imported from all over the

world and now translated into Arabic. Many notable scholars and translators were employed here, including the Banu Musa brothers, al Khwarizmi, Hunain ibn Ishaq, al Kindi, Thabit ibn Qurra, al Jwahiri, etc.

The scholarly activity at the House of Wisdom in Baghdad has been widely and continuously misrepresented in Western accounts of history as a process of translation of Greek texts.

Since these people despised *naql*, in no known case did they blindly copy or translate an earlier text. They *processed* the texts with their *aql*, so that their "translations" of world knowledge into Arabic were not literal translations, and were in the nature of creative reworkings. They were interested in the knowledge contained in the books, not in the books themselves.

We have already seen that some of the translated texts came from the Pahlavi, such as the *Hazar Afsaney* ("Thousand Stories"), translated into Arabic as *Alif Laila*¹⁵³ but with characters like Haroun al Rashid and the Barmakids. It has been speculated that though the main characters of the *Hazar Afsaney* are Persian, since it is set in some islands between India and China, it may have originated in India.¹⁵⁴ Whatever the truth of that, as of today, it is significantly different. This is also true of the *Pañcalantra*, which acquired a fundamentally different moral tone with Ibn Muqaffa's translation from Pahlavi into Arabic.

Secondly, as in Jundishapur, and earlier in Alexandria, the books that were "translated" into Arabic in the Bayt al Hikma came from all over the world, and not specifically from Greece or Alexandria—where no books survived. Many books came from Jundishapur itself, as the above examples illustrate. These included books already translated at Jundishapur such as the Indian *Pañcalantra*, translated as *Kelileh and Demneh*, and the *zij-i-Shahryar*, now translated from Pahlavi to Arabic. As in Jundishapur, many new books were also brought directly to Baghdad from India, such as Indian texts on arithmetic, algebra, trigonometry, astronomy, and logic, most notably translated by al Khwarizmi, who is better known by his later-day Latin name: Algorismus.

Once more, the word "translation" must be understood in the sense of creative reprocessing. Al Khwarizmi's book on Indian numerals and arithmetic was the key book (also called *Algorismus*) from which Europeans eventually learnt to do the elementary algorithms for addition, subtraction, multiplication, and division, without using the

abacus. However, from al Khwarizmi's text (or rather from the 12th c. CE Latin translations of it which survive) it is difficult to identify a specific Indian text which was translated. It could have been the work of Brahmagupta, or the *Paṭiḡaṇīla* (slate arithmetic) of Śrīdhar, or it could have been the *Gaṇīta Sāra Sangraha* of Mahavira, used as a text to teach basic arithmetic for commerce. Most probably, al Khawrizmi prepared a digest after reading several Indian books. Similar remarks apply to algebra, trigonometry, and astronomy.

The composition of the scholars in the House of Wisdom reflected the tolerance and respect for all religions that the philosophers preached. The scholars at the House of Wisdom included one "Gaṇaka" (human calculator or computer) from India, and various Syrian Christians.

A key religious work translated into Arabic was the *Kalam fi'l mahd al-khair* ("The Theology of the Pure Good"), and later came to be known as the "theology of Aristotle". Although ascribed to Aristotle, the text is today believed to be a paraphrase of thirty-two propositions of Proclus' *Elements of Theology*.¹⁵⁵ This is an example of how "Aristotle" was used in Arabic more or less as a generic term for the "Shaykh al-Yunani" or "the Ionian sage". It was applied to Syriac texts, and its correspondence with the historical Aristotle is deeply problematic.¹⁵⁶

The *Elements*, of course, was one of the works again "translated" at the House of Wisdom, by both al Kindi and Thabit ibn Qurra. Al Kindi thought that the *Elements* was the work of one Apollonius the Carpenter. Some later Arab authors did associate "Euclid" with the *Elements*, but explained that the term "uclides" meant "ucli" + "des", where "ucli" means a key, and "des" means geometry. So they understood "uclides" as meaning "the key to geometry"!

10.10 Al Mamun's measurement of the earth

There is clear proof that the astronomy texts in the Baghdad House of Wisdom did *not* come from Greece and that they involved creative reworking. This proof comes from al Mamun's attempt to measure the earth precisely.

Based on the astronomy imported from Persia and India, the Arabs had defined one mile as one second of the arc, or 60 miles as one degree of the arc. Since there are 360 degrees in the full circle, this meant that the circumference of the earth¹⁵⁷ was $60 \times 360 = 21,600$ (Arabic) miles. (1 Arabic mile = 1.96 km, so that the circumference

= 42,336 km, fairly close to the modern value of 40,068 km.) This was far superior to the Roman estimate of $60\frac{2}{3}$ (Roman) miles given in the late 15th c. recensions of the book of Ptolemy. (1 Roman mile = 1.47 km, so that this estimate gave the circumference of the earth as 32,101 km.) The different units reflect different estimates of the size of the earth, and the greater accuracy of the Indo-Arabic figures shows that, contrary to what Western historians have maintained, Indian and Arabic astronomy did not rely on the Greek or Roman.

However, al Mamun was not satisfied, as this estimate (probably based on the Indian astronomy texts¹⁵⁸ earlier imported into Persia) did not agree with the estimates given by the newly imported texts from India.¹⁵⁹ He wanted the issue to be settled decisively, and sent a team to the desert to verify by actual measurement the exact distance corresponding to 1 degree of the arc (latitude). They came up with the answer of $56\frac{2}{3}$ (Arabic) miles to one degree of the arc, corresponding to a circumference of 40,248 km, hardly different from the modern value of 40,068 km.

Nearly eight hundred years later, in 1592, the English (statute) mile was made a bit bigger than the Roman mile at 5280 feet or 1.6 km instead of 5000 feet, but, as can be seen, this still gives a figure for the size of the earth which is way off the mark. At about that time there was so much difference of opinion in Europe regarding the size of the earth that Columbus insisted on reading al Mamun's estimate in Roman miles, and thus arrived at a size for the earth of around 30,000 km which he further reduced by another 5000 km by various manipulations to justify the practicability of his project of reaching the east by sailing west!

10.11 The Golden Age of Islam

So great was the emphasis placed on the acquisition of knowledge, and so vigorous was this activity of "translating" books in the House of Wisdom, and so great the demand for the books in Baghdad, that there was (as in Alexandria) soon a serious shortage of writing materials—papyri. To overcome this problem, the philosophers again applied their *aql*: recollecting the injunction (*hadith*) to "seek knowledge even up to China", the philosophers—who knew about the use of paper in China—advocated importing the technique of paper-making and helped to establish a paper factory in Baghdad. With royal patronage, and the ready availability of paper in Baghdad, facilitating this

knowledge-gathering activity, a very large book bazaar soon became active in Baghdad, which became one of the greatest cultural centres of all time. This period, with its emphasis on knowledge and justice, has naturally come to be known as the Golden Age of Islam.

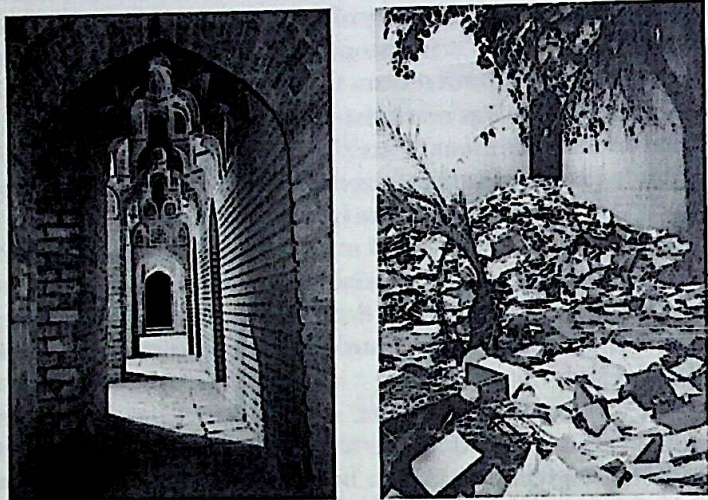


Figure 10.1: Left: A portion of the original Bayt al Hikma from the time of the Abbasid Khalifa al Mamun. Right: The scattered books at the modern Bayt al Hikma, Baghdad, after it bore the brunt of the recent precision bombing.

The example of Baghdad was emulated by their rivals: the Fatimids of Egypt and the Umayyads of Spain, who were also known as great patrons of learning. This practice was also copied by the independent Amirs. This led to the diffusion of libraries across the Islamic world from Samarkand and Bukhara to Fez and Cordoba. The destruction of one Alexandrian library seeded the development of a hundred other libraries throughout the Islamic world.

11 The Crusades and the Hellenization of History

During this Islamic "Golden Age", Christendom was passing through its "Dark Age". This fits in very well with Herodotus' account of history. Herodotus believed that (real) philosophers made the best kings because they sought virtue, not power. Like the "Golden Age of Persia" during the Sassanian empire at the time of Khusrau I, the "Golden Age of Islam" coincided with the time when philosophy flourished. Correspondingly, the "Dark Age" of Christendom coincided with the eclipse of philosophy.

Christianity had, during this "Dark Age", spread across most of Europe, in the same way that it had spread in the Roman empire—by force. Priests continued to wage religious wars with the help of gullible and pliable rulers like Charlemagne who helped to physically eliminate pagans from Europe—by killing them off or forcibly converting them. Since Charlemagne did this on the instigation of the pope, he came to be revered as an ideal Christian ruler.

Despite this success, the contrast between backward Christendom and the Islamic Arabs became even more painfully obvious with the rise of the Umayyad Caliphate in Cordoba, in al Andalus (Spain), bordering Western Christendom headquartered in Rome. With the rise of Islam, in the 8th c., the Umayyad Caliphate of Damascus had extended its rule to Spain on one side (in 711 CE) and to Tashkent and the borders of India on the other. However, in 750 CE the Umayyads were overthrown by the Abbasids, who thereafter assumed the title of Khalifa and shifted the capital to Baghdad. The sole Umayyad survivor, Abd ar Rahman I, fled to Cordoba, which he seized with the help of a rag-tag army, and converted into an Emirate. Cordoba prospered and the grand mosque that he built still stands.

Over the next two centuries, Cordoba grew to the point where its splendour started rivalling that of Baghdad, and in 929 CE Abd ar Rahman III declared himself Khalifa. Cordoba became the leading intellectual centre in Europe with vast libraries and numerous scholars. Although vast libraries were the norm in the Arabic world, the Umayyads had accumulated a library of some 600,000 volumes, 44 of which were used merely for cataloguing the books.¹⁶⁰ Abd ar Rahman's son al Hakim, true to his name, was even more devoted to learning. Many renowned philosophers, such as Ibn Rushd (Averröes) and the Jewish philosopher Maimonides, and over three hundred writers came from Cordoba. The cities of al Andalus (Spain) had over seventy public libraries.

Christendom was no match. Among its most learned men was a priest, Gerbert of Aurillac (who later became Pope Sylvester II, 999–1003). Although from a humble background, he was appointed a teacher of Otto III. He was regarded as so knowledgeable that it was rumoured that he was a magician and a sorcerer, and he was so depicted in medieval Christian art. His cardinal achievement, the acme of learning in Christendom, was a book on the abacus—today regarded as a toy and used to teach counting to children in kindergarten.

Gerbert made vigorous efforts to catch up with the Islamic neighbours by procuring Arab knowledge from Spain. He was the first to bring into Europe the numbers today known as Arabic numerals. In the process, Gerbert made some hilarious blunders.

Arabic numerals actually came from India where the place value system had been used to represent numbers since vedic¹⁶¹ times. Gerbert did not understand that the use of the place value system greatly simplifies arithmetic. Accustomed to the abacus, he tried to understand those algorithms through the abacus. Hence, he simply inscribed these numerals on the back of counters (called *apices*), and continued using the abacus for arithmetic!

Such mistakes highlight the knowledge gap that then existed between the Arabs in Spain and the rest of Europe: the most learned mathematicians of Christendom, with all their advisors, could make neither head nor tail of elementary algorithms for addition and multiplication which are today taught in primary school! Clearly calculating the size of the earth was a task then too far beyond the most learned priests of Christendom, who anyway believed the earth to be flat.¹⁶²

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				⊖	⊕	13
				8	⊖	87
		⊕		⊖	⊕	4 019
⊕			h	⊕		400 520
			h	⊕	⊕	539
⊖				⊕	h	100 065

Figure 11.1: Gerbert's apices from a mid-10th c. manuscript. The numbers are the (Indian) "Arabic" numerals as they looked when they first came to Europe around 976 CE. Gerbert understood how to write numbers using the place value system, but did not understand how greatly this simplified arithmetic over the abacus.

Christian Europe was at this time oblivious of the *Elements* and did not learn of the *Elements* from the Arethas text of 888 CE or from any Greek text.

If the gap in knowledge between the Islamic Arabs in Spain and Christendom was dramatic, the contrast in wealth was far more visible. The eastern wing of the Roman empire had its capital at Istanbul, also called Byzantium. The tribute it paid to Khalifa Haroun al Rashid was massive compared to the tribute that Justinian had earlier paid to the Persian empire at the time of Khusrau. The delegation that

Charlemagne sent to Haroun al Rashid was dazzled by the splendour of Baghdad, and the gifts that they brought back were so far beyond anything that Europeans had seen that they became models for Carolingian art.

Cordoba was then easily the richest city in Europe and many of its opulent buildings still stand.¹⁶³ When Abd ar Rahman took the field he was attended by "a guard of 12000 horse, whose belts and scimitars were studded with gold".

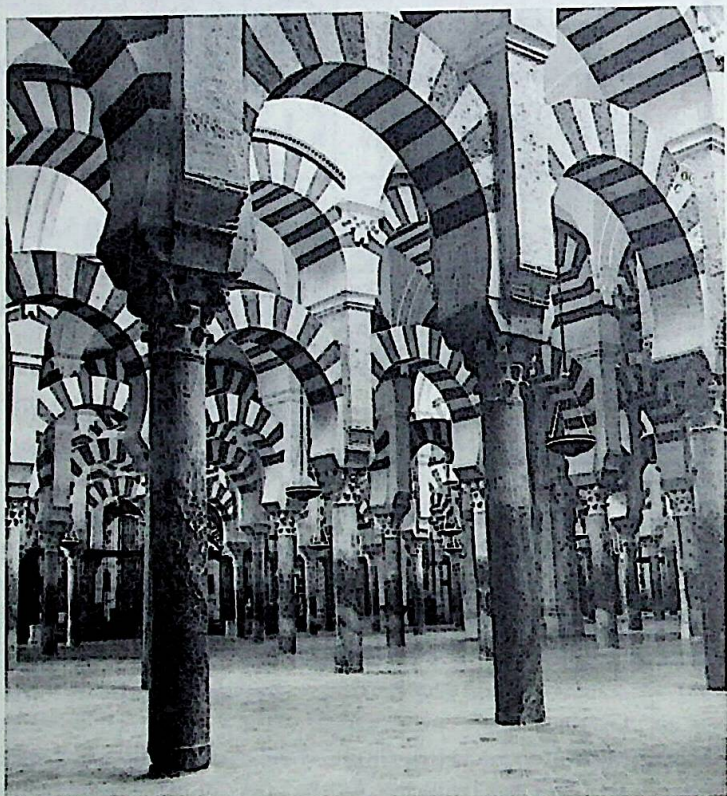


Figure 11.2: Cordoba

The priests were envious of the fabulous wealth of the Arabs (not only in Cordoba, but also in places like Sicily).

To compound their envy, the elimination of pagans in Europe had created a peculiar problem. The priests had thrived for so long on the hatred of pagans that the loss of their hate object also meant loss

of their agenda! After the death of Charlemagne they could not find a suitable gullible ruler as replacement. In the 10th and 11th c., the revenues of the priests declined, and they were reduced to petty trade in moral leniency—the selling of moral indulgences to rich people to ensure for them a place in heaven!

The priests brooded over the loss of their agenda, and the decline in their revenues. Eventually an opportunity presented itself by a curious turn of events.

11.1 Toledo and the proto-Crusades

By 1011 the Umayyad Caliphate collapsed with amazing suddenness, after a disastrous civil war over succession, although the Caliphate “officially” lingered until 1031. With the collapse of central authority, the former Caliphate splintered into numerous small fragments with different parties declaring themselves independent *taifas*—petty kingdoms.

Toledo was one such *taifa* which now attracted many intellectuals from Cordoba. The *taifa* was governed at this time by Prince Ismael who welcomed all scientists and poets and even began to re-form the library of al Hakim II (the son of Abd ar Rahman III). His successor, the renowned al Mamoen, went even further to make Toledo an outstanding cultural and intellectual centre. He annexed Valencia and Cordoba to the *taifa* of Toledo.

However, al Mamoen's grandson and successor, Yahya al Kadir, was deposed in a coup. The leaders of the coup ruled in the name of the ruler of Marrakesh (Morocco), al Mutawakkil. Eventually, al Kadir was restored as ruler, but he remained weak. When Toledo faced a direct attack by the neighbouring Christian kingdom of Castile, al Kadir's position became untenable.

Despite its excellent natural defences, the *taifa* of Toledo faced internal dissension. As happened a few years later in Jerusalem, there was a large population of local Christians (called Mozarabs) inside the city, who were sympathetic to the invader. The reason for their disaffection was simple. Islamic Arabs who were still under the influence of philosophers were more tolerant than the Christian kings of Europe under the influence of priests. Muslims did not kill or exile religious dissenters. Christians were tolerated in Islamic lands; however, in some places they were required to pay an extra tax. This extra tax made the Christian population of Toledo unhappy.

The already unpopular al Kadir could not manage this unhappiness, especially when the invaders were Christians.

Under pressure from all sides, Toledo opened its doors to the invading army in 1085. Al Kadir had negotiated a deal with the Castilian king Alfonso to whom he had once granted asylum in Toledo (after Alfonso had lost a battle with his own brother). Under the terms of this deal, al Kadir conceded Toledo, and was provided safe passage to Valencia, where he was installed as the ruler.

Though the official date for the start of the first Crusade is 1095, it is remarkable how often the fall of Toledo is portrayed by modern-day historians as a case of Christian "reconquest" which "freed" Toledo from Muslim rule. This terminology of "reconquest" is amusing, because there was no earlier conquest; not only had Toledo been under Muslim rule for the preceding three centuries, it never had any earlier Christian rulers. (Its earlier rulers were Visigoths who had not converted to Christianity then.)

Anyway, "reconquest" suggests a Christian vs Muslim polarization, so one may suppose that the proto-Crusades had already commenced when Toledo fell. Though the official start date of the Crusades is usually put as 1095, which was ten years later, it is misleading to attach such a sharp boundary to it. In fact, a prototype Crusade had already been tried out earlier in 1063 or 1064. At that time, Pope Alexander III, noticing the wealth and weakness of al Andalus (Spain), had already implemented the idea of the Crusades by sending a large multi-nation army under his banner. The army had slaughtered 50,000 Muslims, but was defeated within a year. This was followed by an appeal by Pope Gregory VII for a Crusade. This was similar to Pope Urban II's appeal of 1095 which asked people to lay down their lives, since "our Redeemer... has laid down his life for us... we ought to lay down our lives for the brethren." [1 John 3:16]

In any case, the peaceful submission of Toledo meant that the town was not sacked, and remained intact, especially its huge library of Arabic books. This library now came under Christian control. The priests were not sure what to do with those books. On the one hand, they had been trying to catch up with the Arabs for nearly a century, so there was naturally a faction of priests which was interested in harvesting the knowledge in these books. On the other hand, the tradition of Christianity suggested that the books be burned, as had been their past practice for centuries. There was a stalemate, and everything was forgotten in the events of the next decade.

11.2 The Crusades

Encouraged by the success of the proto-Crusades, the priests got back into big business, by inventing a new hate object—the Muslims—and starting a new religious war: the Crusades. To encourage people to participate, the priests offered wholesale indulgences to those who participated in the Crusades. The extent of the enthusiastic response to Urban II's appeal for the Crusades was perhaps beyond the expectations even of the priests.

The priests had evolved a diabolical plan by which they would win regardless of military victory or defeat in the Crusades. Those who went for the Crusades needed money to finance their long journey. This money was most often raised by mortgaging their lands to the church. When the first rag-tag army of Crusaders under Peter went and got themselves slaughtered, the lands they had mortgaged were grabbed by the church. The Crusaders also slaughtered many Jews on the way, and it is not hard to guess who grabbed the property or wealth these Jews owned. Whenever the Crusaders won such a significant victory, the priests got $\frac{1}{4}$ th share of the loot. The church prospered.

There were other significant business angles to this venture, such as the grant of moral indulgences to petty criminals for agreeing to participate in the Crusades—thereby helping the state to get rid of a troublesome section of its population.

This business aspect of the Crusades is rarely brought out in the numerous histories of the Crusades, which usually base themselves on documents penned by priests. However, this is like going by the official version of the Iraq war given out by the Bush government: based on this version of Bush's modern-day Crusade one would imagine that Iraq's oil wealth had little or nothing to do with the matter.

Histories of the Crusades written by Christians invariably talk about Jerusalem and freeing it.¹⁶⁴ But this is very hard to believe. In fact, King Frederick II who knew Arabic and had experience of Muslims in Sicily, easily secured¹⁶⁵ by negotiation the right for Christian pilgrims to travel to Jerusalem, and this was more than any Crusader had secured by force since the first Crusade. This could also have been done earlier. However, Frederick was booed for not having used force. Clearly, Jerusalem was just a flimsy excuse, and the real objective was to loot and kill, to grab the wealth of non-Christians and to eliminate them.

Loot they did and how! Fulcher of Chartres, a hagiographer who accompanied the Crusaders, recounts with great pride the cleverness of the Christians in discovering that "they could find byzants [gold coins] in the stomachs and intestines of the dead" Muslims who might have swallowed them. Accordingly "they burned a great heap of dead bodies, that they might more easily get the precious metal".¹⁶⁶ This image of Christian Crusaders jostling each other to rummage for gold coins among half-burnt and stinking dead bodies is a telling account of what the Crusades were really about, and what concept of Christian piety the priests taught.

In fact, practically the first Christian act of the Crusaders was to kill and loot Jews in Rhineland, and to enrich themselves with the plunder.

The Jews of this city [Mainz], knowing of the slaughter of their brethren, and that they themselves could not escape the hands of so many, fled in hope of safety to Bishop Rothard. They put an infinite treasure in his guard and trust, having much faith in his protection, because he was Bishop of the city. Then that excellent Bishop of the city cautiously set aside the incredible amount of money received from them. He placed the Jews in the very spacious hall of his own house.... But Emico and the rest of his band held a council and, after sunrise, attacked the Jews in the hall with arrows and lances. Breaking the bolts and doors, they killed the Jews, about seven hundred in number, who in vain resisted the force and attack of so many thousands. They killed the women, also, and with their swords pierced tender children of whatever age and sex.¹⁶⁷

It is estimated that some 10,000 Jews were killed. The church implicitly approved. Later, during the Inquisition, the priests took direct part in the torture and killing of Jews, to extort more money from them, these being deemed great and moral Christian acts of piety in the service of the church.

The fall of Jerusalem to the Crusaders led to another memorable massacre.

Piles of heads, hands, and feet were to be seen in the streets of the city. It was necessary to pick one's way over

the bodies of men and horses. But these were small matters compared to what happened at the Temple of Solomon, a place where religious services are ordinarily chanted. What happened there? If I tell the truth, it will exceed your powers of belief. So let it suffice to say this much, at least, that in the Temple and porch of Solomon, men rode in blood up to their knees and bridle reins. Indeed, it was a just and splendid judgment of God that this place should be filled with the blood of the unbelievers. . . .¹⁶⁸

It is the last part which is the most interesting. The Christian knights felt they were carrying out a high moral act, illustrating the very epitome of Christianity, the doctrine of love. And it is in this form that their feats were celebrated in Western literature. The very terms "crusading spirit" and "crusader" have positive connotations in English, and even today, it is easy to find any number of laudatory accounts of the Crusades on the Internet. It is not hard to imagine that the same people who think of the Crusades as the epitome of Christian heroism would rush to condemn acts of violence by Muslims as Islamic terrorism!

11.3 The second Crusade

The unexpected success of the first Crusade, and the huge amount of plunder the Crusaders brought back, led to the demand for a second Crusade, with greedy and ruthless Crusaders hoping to grab further rich spoils. History, they say, is written by victors, but in this case it was written by the losers! Those who believe this history, written by priests at a time of religious war, deserve what they get.

The real second Crusade involved such a terrific defeat for the invading Christian forces that it has been made invisible to the non-expert by burying it in between the official first and second Crusade! It is called the Crusade of 1101. At the battle of Mersivan, one batch of Crusaders were trapped by the Turks, led by Kilij Arslan, and though the Crusaders fled, leaving behind women and children, only a few of the leaders managed to escape. A second batch of Crusaders was also practically wiped out by Kilij Arslan in the battle of Heraclea. A third contingent of Crusaders was also massacred at the same place by Kilij Arslan.

After these stinging defeats, the religious ardour for the plunder of the Crusades cooled off for a while.

Though the Crusade of 1101, due to its complete failure, is useless for the purposes of Christian glorification, it is important to understand why no further military adventure was launched for some time, and other avenues were sought to dominate Muslims. In particular, the more intelligent churchmen realized that they needed to study their enemy.

11.4 Adelard and the *Elements*

It was shortly after this that the *Elements* first came to Christian Europe through a military spy. After the failure of the Crusade of 1101, Henry I, the clerical King of England, sent out a spy, Adelard of Bath, to Muslim lands, disguised as a Muslim student. The exact route Adelard took remains a secret. However, Adelard mentioned one dramatic event in the course of his travels. He described how, when he was near Antioch, he was caught in the middle of a bridge at the time of an earthquake. Since this earthquake occurred in 1114, we know that Adelard was then near Antioch.

Adelard gathered various kinds of useful information from Muslim lands for several years between 1110–1125,¹⁶⁹ including, of course, the method of reconstructing bridges, which he observed at first hand. On his return, he settled down in Bath, and became a teacher of Henry II. Adelard was the first to translate the *Elements*, from Arabic into Latin. This was when Christian Europe first heard of the *Elements*.

It has long been believed that Adelard's translation was the version used in a later translation by Johannes Campanus, the first version of the *Elements* to be printed in 1482. The Adelard version thus came to be regarded as the basis of most editions of the *Elements* that were used in Europe for the next four hundred years, although this has been contested.¹⁷⁰ At any rate, the *Elements* came into Europe in the form of Latin translations of the Arabic book of the Islamic philosopher Thabit ibn Qurra.

11.5 The Toledo translations

In any war, it is critical to gather information about the enemy. Spies like Adelard gathered all sorts of information from educational techniques to building bridges. The books at Toledo had a variety of useful information. However, the priests were unsure whether to burn them or to learn from them. Eventually, those in favour of exploring Arabic

learning seem to have won the day, and a full-fledged translation industry was set up in Toledo in 1125 CE to translate books from Arabic to Latin. The aim was to gather information, in preparation for the next Crusade.

The project at Toledo functioned under the leadership of Archbishop Raimundo, who appointed Archdeacon Dominic Gundisalvi as the overall supervisor. Since the Koran was also to be translated, there is no doubt that Raimundo had the necessary clearances and instructions from the highest level of priests—the pope and the college of cardinals. A large quantity of gold was made available for this translation through Peter, Abbot of Cluny, in 1142 (who obtained this gold as the priest's $\frac{1}{4}$ th share of the loot from the Crusades). The *Elements* was one among some eighty books translated from Arabic to Latin, by Gerard of Cremona, a translator based at Toledo.

Quite unlike what happened in the Baghdad House of Wisdom, where people applied their *aql*, or intelligence, Gerard's translations are characterized by an extreme literalness. Perhaps this was how Christian scribes were trained. Perhaps this was a style that came naturally to the enormous task of translation that Gerard undertook, without any proper understanding either of the contents of the texts or of the Arabic language! Thus, the process of translation involved Christians (called Mozarabs) and Jews as intermediaries. These Mozarabs and Jews had existed peacefully under Arab rule in Europe and knew Arabic along with other European dialects. They verbally translated the Arabic text into Castilian or a Romance dialect, which was then translated and written down in Latin by the Great Translator. In line with the priests' policy of regarding non-Christians (or deviant Christians or new Christians) as somehow sub-human, the intermediaries remained unnamed.

The *Elements* was one of the books translated through this collective enterprise credited to Gerard of Cremona. Although Adelard had the advantage of a thorough knowledge of Arabic, Adelard, too, did not use any Greek terms like "hypotenuse" in his translation, but transliterated terms from the Arabic into Latin, including the term *al kayeda*!

This collective process of literal translation led to some strange howlers. For example, the *Oxford English Dictionary* tells us that the trigonometric term "sine" derives from the Latin *sinus* meaning "fold" which derives from the Arabic *jaib*, a fold in a garment, used as a pocket. In what mysterious way does trigonometry relate to the

pockets in the clothes one wears? The learned dictionary does not tell us. The actual story is as follows. Starting from about the 2nd c. CE, Indian astronomy texts invariably had a section on trigonometry, which was invented in India for simplifying astronomical calculations. Two key trigonometric functions were the "sine" called "jya", and the cosine called "kojya", a short form for "kotijya", where "koti" referred to the base of the triangle. (The cosine is today defined as the ratio of base to the hypotenuse of a right-angled triangle; Indian texts took it as just the base measured in units of the radius, which amounts to the same thing.) In the vernacular, the Sanskrit "jya" was simplified to "jiva". When Arabs translated from Indian texts, they retained the term "jiva", which was rendered as "jiba" in Arabic. However, this was written as just the consonantal skeleton "jb" with the vowels omitted as understood, as is done in present-day SMS abbreviations, such as the abbreviation "pls" used for "please". The Toledo translators misunderstood this "jb" as "jaib", a word in common use, for they were completely ignorant of the subject. These howlers are interesting because they bring to light the real history buried under voluminous concoctions.

Another such howler was the term "surd" used for a square root which is not a whole number or a rational number, such as the square root of 2. The word "surd" derives from the Latin *surdus*, which means "deaf". Why are some square roots deaf?! Al Khwarizmi used the term "(*jadhr*) *asamm*", meaning "deaf (root)". This is incomprehensible until we recall that the Sanskrit word for the diagonal of a square (or the hypotenuse of a right-angled triangle) is *karna*, which is also the word for "ear". (For a unit square the diagonal is the square root of 2, and, from before Pythagoras, early Indian texts like the *śulba sūtra* calculated the square root using the diagonal, giving approximations when an exact figure was not possible. Thus, bad root = bad diagonal = bad *karna* = bad ear = deaf! Obviously, the term came into Latin from the Arabic.¹⁷¹

In particular, there is a very real possibility that the word "uclides" was one such howler which arose during the course of the Toledo translations. The word is derived by some Arab authors as a composite of "uclī" meaning "key" and "des" meaning "geometry", so that "uclides" means "key to geometry". One can well understand how the term "uclides" was naturally associated with the *Elements*. Possibly, during the Toledo translations, this term was, in like manner, misunderstood as the name of a Greek, Euclides, who had authored

the *Elements*. The conclusion, that the name "Euclides" originated in a howler, is strongly corroborated by the fact that the name Euclides relates to Latin manuscripts of the *Elements*, and is not found in its Greek manuscripts.

11.6 The Hellenization of history

While this misreading of "Euclid" for "uclides" could have been just due to a misunderstanding, it could also have been a deliberate fabrication. There was a natural reason for the priests to want to promote the idea of Greek authorship of the Arabic texts at Toledo. The Crusades had aroused intense hatred of Muslims among Christians of Europe. So the priests who had so long been preaching Christian supremacy felt a strong sense of shame in acknowledging the reality that Christians were learning from books written by Islamic scholars. This sense of shame was expressed by Daniel of Morley, a translator at Toledo, as follows:

Let no one be shocked if, with reference to the creation of the world, I should invoke the testimony of pagan philosophers rather than the church fathers. . . . Let us then borrow from them and, with God's help and command, rob the pagan philosophers of their wisdom and eloquence. Let us take from the unfaithful so as to enrich ourselves faithfully with the spoils.¹⁷²

Notice how Daniel considers it "shocking" that a Christian should learn from Islamic sources. He can't even call it by the correct name of "learning" but refers to it as "borrowing", making one wonder what it was that was returned! Notice also how he feels the need to justify his actions by claiming that his partisan god had commanded him to rob and steal from others.

While it is interesting to note the strange moral values of Daniel of Morley's god, who asked him to steal from others, this sort of justification was obviously too weak in the atmosphere of religious hysteria that prevailed in the days of the Crusades. Something stronger was needed to justify the wholesale translations at Toledo. A face-saving formula was soon worked out which allowed the priests to have their cake and eat it too.

This formula involved a simple lie to manipulate history—a process in which the priests had ample experience since Orosius' *History*

Against the Pagans, written in the 5th c. The object of such history-writing was to tell lies in service of the church. Claiming a false ancestry is a common trick used by charlatans and social climbers to become socially respectable. In this case a false ancestry was claimed for knowledge. It was claimed that all useful (secular) knowledge in the books at Toledo had been developed by the early Greeks.

Here the distinction between early Greeks and later Greeks like Hypatia is crucial. From the time of the earliest church historian, Eusebius, the early Greeks had been regarded as "friendly" to Christianity—obviously there was no possibility of conflict between Christian priests and early Greeks since they never co-existed. The early Greeks were even before Jesus, so that made them as theologically correct as non-Christians could be. This was quite unlike the later-day Greeks of Alexandria who confronted the church when it altered Christian beliefs.

Even among early Greeks, someone like "Euclid", about whom nothing was known, ideally suited this strategy: for the priests needed also to reinterpret many of these texts in conformity with their latest alteration to Christian doctrine. Any convenient sort of thinking could be easily imposed on someone about whom nothing was known.

It was further claimed that those against whom the Christian priests had waged religious war (everyone else)—like the later Greeks in Alexandria or the Muslims—had had absolutely no hand in *creating* this knowledge, and had merely played the role of *passive carriers* of this knowledge. Therefore, all this knowledge was declared as the "Christian inheritance".

Obviously there was not the slightest evidence for this story. We have seen this lack of evidence in the case of Euclid. But, this lack of evidence applies to *every* text from Toledo ascribed to a Greek, because there was no continuous tradition of intermediate texts linking any of these texts to the purported early Greek author.

But priests don't care about evidence—they tell so many stories about heaven and hell, for example, for which there is no evidence. (I personally know no one who visited heaven or hell and came back; do you? So, how do these priests know what happens after death?) So, they are well aware that evidence can be substituted by further stories, or by apologia, etc. However, this fantastic story about the Greek origins of knowledge helped the priests to deny the manifest fact they were learning from non-Christian sources to whom they were

hostile—instead they claimed that Christians were only getting back their Greek inheritance which the Muslims had preserved for them!

By means of this fantastic story, the sense of shame in learning from non-Christian sources was converted to a sense of pride in recovering the lost "Greek inheritance". In the atmosphere of religious fanaticism that prevailed during the Crusades, no one questioned this sort of history. But the strange thing is that this fantastic story continues to be believed to this day.

Knowledge from various parts of the world, including much Indian knowledge, went into the Arabic books even at Baghdad. This knowledge was directly reflected in some Arabic books at Toledo—and Europeans were well aware of that from before the Crusades, when Gerbert imported Arabic numerals, based on al Khwarizmi's *Hisab al Hind* or "Indian Arithmetic". We have also seen how the knowledge in the Great Library of Alexandria was not of Greek origin, but derived from the earlier civilizations of Egypt, Babylon and Persia, though some of this was later translated into the Greek language. All this knowledge was now attributed to Greeks. In this way, the priestly conception of "Greek inheritance" apportioned to the Greeks, hence indirectly to Christians, the credit for *all* world knowledge developed until the 11th c. CE!

Irrespective of whether the name "Euclid" originated as a Toledan howler, the myth that an early Greek called "Euclid" wrote the *Elements* complies with this formula of Hellenization. A Greek-sounding name (Euclides), and an appropriate time frame, was all that was needed for this formula to work—there was no need to know anything more about this "Euclid"! In fact, as we shall see in the next chapter, it was actually convenient that nothing was known about this Euclid.

This story of the immaculate Greek conception of knowledge, up to the 11th c., is so commonplace today that its absurdity needs to be repeatedly pointed out—for "Euclid" is not the only myth that this formula has thrown up.

Imagine that someone were to maintain today that all the present-day knowledge of the Western world is derived from the translations at Toledo, and that nothing new has been added to it since then, and that the Western scholars and scientists have served merely as the passive carriers of this Arabic knowledge! Would this not sound absurdly chauvinistic and foolish? But Toledo some 900 years ago is much closer in time to us than it was to the date of Aristotle (or

the supposed date of "Euclid"), some 1500 years before the Toledo translations.

How did all world-knowledge develop in the small city states of Greece? This tall claim can make even a dim-witted person suspicious. To diminish that suspicion, later-day historians have invented a new term "Hellenic". To make the thesis more plausible, it was argued that Greek culture was spread over a large area by the conquests of Alexander. This "Hellenic" civilization, the story suggested, was seeded by the intellectual impulses from the Greeks. One is, therefore, sometimes asked to discriminate between "Greeks" proper, and "Hellenic" civilization in the territories conquered by Alexander.

The conquests of Alexander (a Macedonian) certainly led to the diffusion of the Greek language in areas where it was not spoken earlier. However, so far as *knowledge* is concerned, it often flows *towards* the military conquerors.

An easy way to understand how this happens is to think in terms coined by the historian Arnold Toynbee. According to Toynbee, one of the repeated patterns that can be observed in history is the following. Barbarian populations grow on the peripheries of large civilizations. Eventually, these barbarians, attracted by the wealth of their more civilized neighbours, get together and attack and try to overrun the civilization.

The Crusades are one example of such a "barbarian incursion": the Arabs were more civilized and prosperous than their Christian neighbours in Europe. There was little that the Christians could teach Arabs, and we see that in the process of these military campaigns they learnt from the Arabs. Similarly, the Moghuls (Mongols) attacked and overran Baghdad. Within a century of this campaign the Moghuls had adopted Islam, and they soon set up astronomical observatories in Samarkand.

Likewise, the Greeks were on the periphery of the vast Egyptian and Persian civilizations. As the Greek historian Herodotus informs us, the Greeks were like children before the Egyptians. As we have seen (p. 58), in actual fact, the earlier Greeks in Athens lacked scientific knowledge of any sort, and regarded it as profane. It was Alexander's military forays which led to a large-scale flow of knowledge *towards* the Greeks. These military forays brought in a large booty of books from much of the civilized world: Egypt, Persia, Babylon. Books from India and other parts of the world also subsequently travelled to Alexandria.

So, the Greeks in Alexandria began (like 12th c. Europe) by translating the available world knowledge into their language.

11.7 The bazaar effect

There were some other confounding factors which encouraged this fantastic thesis of the Hellenization of history: that all (or most) knowledge was immaculately conceived by the Greeks.

We have seen how the Alexandrian model was later replicated in Jundishapur, and in Baghdad, but with some differences. A huge culture of books grew in Baghdad. Not only the Khalifas but Amirs and other wealthy people started purchasing books. This led to a flourishing book bazaar in Baghdad. We can form some idea of the number of titles that circulated in this bazaar from the long list (*fihrist*) of books prepared by a 10th c. Baghdad bookseller called al Nadim. This book describes the perceptions prevailing in the 10th c. book bazaar, much of which may be sheer gossip.

The market inevitably brings in dishonesty: there is the “bazaar effect”. Because books commanded a high price, a large number of fakes started circulating. As every bookseller knows, a book by a well-known author is easier to sell. There was also a great demand for books by ancient authors; so, such books too commanded a higher price. In this way, numerous books got attributed to Aristotle, a name both well known and ancient. This name was used in Baghdad only to mean “ancient Greek sage”, and not the specific individual today known as Aristotle, Alexander’s teacher.

Apart from those who wanted to make money, there were those who wanted to promote a point of view. Such people also often attributed their own opinions or the opinions of their leaders to better-known people like Aristotle. Hence, also, names like Aristotle became a big brand.

This situation is described by Adelard, who ruefully says that, in his time, people valued only the opinions of ancients. Therefore, he jokingly prefaces his book by saying that people should suppose that it was some great man who said everything that he has to say.

Others did not joke about it, they simply did it. It was precisely on account of such fakes that al Nadim felt the need to prepare his list. Of course, al Nadim was a shopkeeper, a bookseller not a scholar. His aim was to sell books, not to ascertain the truth. So, his list only identifies those fakes that a knowledgeable shopkeeper

or customer could easily identify as fakes. It is quite likely that al Nadim's list includes numerous books that are actually fakes, but were quite saleable as genuine books. After all, hundreds of books were attributed to Aristotle, and one individual (or group of individuals) could not have authored all of them.

The history-fakers at Toledo exploited such incorrect or false attributions from the Baghdad book bazaar as evidence that all Arabic literature of value actually originated with the Greeks. In this manner the "bazaar effect" too aided the Hellenization of history.

11.8 The *Elements*: from Byzantine Greek

Initially, there was one problem with this process of Hellenization of history. There were no actual Greek sources available. No such sources were available even at Baghdad, where the translations were carried out from Pahlavi and Syriac (apart from Sanskrit etc.).

However, the trick of Hellenization of history received a further boost, after the fall of Istanbul to Mohammed the Conqueror in 1452. Byzantine Greek texts started pouring into Europe through Christian refugees and those who wanted to encash the booty of conquest. (Islam did not permit the burning of books, so the Islamic conquerors of Istanbul did not burn down its library, as the Crusaders did when they captured Constantinople a couple of centuries earlier.)

When these late Greek texts from Eastern Christendom arrived in Western Christendom, they were used to promote the fantastic story woven earlier. The fact that these texts were in the Greek language thus acquired undue significance. The difference between early Greek texts and late Byzantine Greek texts was completely overlooked—both were seen as just Greek. It did not strike the common people that many of these texts might merely be Greek *translations* of texts that were originally written in Arabic or obtained from elsewhere. On the contrary, it was naively imagined in Europe that these Byzantine Greek texts reflected some "original" Greek texts free from any sort of Arabic influence that might have crept into the books at Toledo! Those stories are told, even to this day in the Library of Congress, for the priest aims to influence the ruler by whispering lies in his ear.¹⁷³

It was from these late-Greek or Byzantine Greek texts that the first translation of the *Elements* from Greek to Latin eventually took place in the 16th c. CE. These texts were naively seen as offering conclusive evidence of the achievements of the early Greeks.

However, many Byzantine Greek texts involved translation from Arabic into Greek. This process of translating from Arabic to Greek commenced right from the time the Byzantine empire fell way behind the rapidly expanding Arabs, and was paying tribute to Haroun al Rashid.

For example, the Indian *Pañcalantra* had been translated from Sanskrit to Pahlavi at Jundishapur, and then from Pahlavi to Arabic by Ibn al Muqaffa, at about the same time that it was translated into Syriac by the priest Bud. It was further translated from Arabic (or Syriac) to Greek by Simon Seth, ca. 1050,¹⁷⁴ and this was then further translated from Greek into Latin a couple of hundred years later, ca. 1251, for Alfonso X as *Calila e Dimna* (the distorted names of two jackals, Kartaka and Damnaka, in the *Pañcalantra* story). Many later Greek texts are known to be translations from the Arabic, and given the vast Arab expenditure on learning, over five hundred years, it is reasonable to expect numerous other such translations from Arabic to Greek from a couple of centuries earlier. The earliest text of the *Elements*, called the Arethas text, of 888 CE, is probably such a translation from Arabic to Greek.

The process initiated by John of Gorze and Gerbert of Aurillac in the West would have commenced earlier in the eastern Roman empire. Of course, Christian priests from Constantinople (Istanbul) would have gone to Baghdad, not Cordoba. The translations from Arabic to Greek, therefore, probably commenced by the 9th c. These are known to have gone on until the 15th c. CE, as we will see in the case of Copernicus (p. 136). Therefore, these later-day Byzantine Greek texts include knowledge from Arabic books—they are far too late to provide any serious evidence of any actual achievements of the early Greeks.

Indeed, there is no reason why Arabic texts translated into Latin should not have been translated again into Greek. There were at least two and a half centuries available for this process. The bases in the east established by the Crusaders had opened a profitable route for Florentine trade, and encouraged such exchanges.

11.9 The end of the Crusades

The Byzantine Greek texts which arrived in bulk in Europe after the fall of Byzantium in 1452 also marked the end of the Crusading

dreams. Christendom annexed and retained Spain, but lost Constantinople.

The conquest of Spain had provided Christian priests the excuse to launch the Inquisition. Initially directed against Jews and Muslims (or forced converts from among them), it later became just a way to loot through extortion. The greedy priests cruelly tortured millions of innocent people to death. The priests argued that the more gruesome the torture, the more perfectly it illustrated the doctrine of love: for the priests claimed they were only faithfully demonstrating the eternal torture the Christian God would dispense to non-Christians in hell. This obsession with sadistic torture as a key aspect of Christian justice is amply reflected also in the literature of the period, such as the works of Dante.

Some Christians did protest against the bloodthirsty actions of the priests. They insisted that Christianity was a doctrine of love which asked people to turn the other cheek, and not run rivers of blood. They challenged the authority of the priests, saying they were not true representatives of Christianity. These challengers, such as Jan Hus, were branded heretics and burnt at the stake.

The Inquisitors required very little by way of proof. Simple visual evidence—wearing “Moorish” clothes—was proof enough. The accused did not get the benefit of the doubt.

These horrors of the Inquisition had a peculiar effect on history. People dared not acknowledge learning anything from non-Christian sources, for fear of being branded heretics. A prime example of this is Copernicus, himself a priest. Looking among the Greek books on astronomy in the Vatican library, he found a work of Ibn Shatir of Damascus, which had been translated from Syriac to Greek. Copernicus translated that book from Greek to Latin. However, his friend Scultetus was imprisoned by the Inquisition and tortured for ten years. Fearing that he too would be denounced, Copernicus, therefore, did not acknowledge that he had translated a “heretical” source. He claimed it was his own work. Even so, he dared not publish it during his lifetime, but sent his book for publication only when he was on his deathbed. By way of ample precaution, he wrote a preface, citing a former pope and assorted cardinals and bishops to prove that he was theologically correct. Because he suppressed his non-Christian sources, he was praised sky-high as a revolutionary discoverer. Even today, over 50 years after his sources were exposed, Harvard historians

continue to justify the terminology "Copernican revolution" by saying that his was a case of "independent rediscovery".

The case of Copernicus was hardly an isolated one. There are many such notorious cases of "independent rediscovery". These include Mercator and his celebrated projection, known from centuries earlier in China. While the idea of Mercator's map came from China, the precise trigonometric values needed for it (then called "tables of secants") came from India. Mercator's sources however are not known to this day, since he was arrested by the Inquisition, and presumably destroyed the evidence. These scandalous cases of "independent rediscovery" also include top church officials, such as the Jesuit general Christoph Clavius who published in his name the precise trigonometric values (precise to the 10th place after the decimal point) imported from India, but did not know enough trigonometry to calculate the size of the earth, as had been done a thousand years before him. The list includes Tycho Brahe, Royal Astronomer to the Holy Roman Empire, whose astronomical model is a carbon copy of the one found earlier in India. And, the list also includes Newton, credited for the calculus which developed a thousand years earlier in India.

As a result of this distorted history, the origin of all knowledge was attributed to the theologically correct: Christians in post-Crusade Europe, or their friends, the early Greeks. This is still pretty much the situation today. Open any encyclopedia and its history of any scientific topic will begin with an account of what the early Greeks did, and then jump to post-renaissance Europe. That church history erased or belittled all opponents of the church would have been a hugely comic matter, except that this constant belittling was used to justify the physical erasure and genocide of non-Christians.

Barely a year after the fall of Istanbul, Pope Nicholas V issued the bull (*fatwa*) *Romanus Pontifex*, in 1453. This called upon "intrepid champions of the Christian faith... to invade, search out, capture, vanquish, and subdue all Saracens and pagans whatsoever, and other enemies of Christ wheresoever placed, and... to reduce their persons to perpetual slavery..." Soon Pope Alexander in his bull *Inter Caetera* of 3 May 1493 divided the world into two parts, giving one half to Spain, and the other to Portugal! These bulls were supported by numerous citations from the Bible.¹⁷⁵

These bulls promoted the "discovery" of new lands. The incentive offered was in the "moral" doctrine that the first Christian to spot any piece of land became its owner! Hence it is said that Columbus

"discovered" America or that Vasco da Gama "discovered" India or that Cook "discovered" Australia, for the word "discovery" became a legal term related to ownership. The key aspect of this church policy was that non-Christians who inhabited these lands were regarded as non-persons fit to be killed—exactly as happened in the triple genocide which followed on those three continents. According to an eyewitness, the priest Las Casas, who accompanied Columbus,¹⁷⁶

And the Christians, with their horses and swords and pikes began to carry out massacres and strange cruelties against them. They... spared neither the children nor the aged nor pregnant women nor women in childbed, not only stabbing them and dismembering them but cutting them to pieces as if dealing with sheep in the slaughter house. They laid bets as to who, with one stroke of the sword, could split a man in two or could cut off his head or spill out his entrails with a single stroke of the pike. They took infants from their mothers' breasts, snatching them by the legs and pitching them headfirst against the crags or snatched them by the arms and threw them into the rivers, roaring with laughter and saying as the babies fell into the water, "Boil there, you offspring of the devil!"... They made some low wide gallows on which the hanged victim's feet almost touched the ground, stringing up their victims in lots of thirteen, in memory of Our Redeemer and His twelve Apostles, then set burning wood at their feet and thus burned them alive. ... With still others, ... they cut off their hands and hung them round the victim's neck ...

The terms like "offspring of the devil", and the reference to Jesus and the Apostles, show that these genocides were instigated by the doctrines of Christian priests. The criminals thought they would go to heaven, and that the victims of these crimes, including the innocent babies and pregnant women, would go to hell! Their head priest had told them so.

Las Casas estimated that some 12 million people were killed thus. This holocaust involved twice the highest estimate of the number of Jews killed by the Nazis.

The few surviving native north-Americans annually burn copies of those papal bulls in protest. But, though the church withdrew its strictures against Galileo, it never withdrew this command for

genocide against non-Christians. On the contrary, it again distorted history. Just as the Christian war against "pagans" was supported by false stories of the persecution of Christians by "pagans", just as the Crusades against Muslims were instigated by utterly false stories that they were persecuting Christians, so also false stories were spread about "Red Indians". To this day, we have these "Western" stories and films which invariably have the "cowboy" heroes battling villainous "Red Injuns".

So, while Hitler is regarded as the embodiment of evil, the genocide in the Americas is seen as the epitome of heroism. The same Hollywood which produces dozens of World War II films also produces dozens of Western films which celebrate the cowboys. Those are the stories and games on which American children are still brought up. (Imagine how one would react today if some German children were brought up on games of killing Jews!) Just as Nazi collaborators are regarded as equally guilty with Hitler, the blame for the genocide of "red" Indians cannot be laid entirely on evil popes, but must extend to the collaborators and celebrators. That includes Protestants, as the US Supreme Court noted in a celebrated judgment.¹⁷⁷

This 19th c. case concerned a native American "Indian" who approached the US courts, imagining he would get justice.¹⁷⁸ He reasoned that the land was originally theirs and should be restored to them. The judge, however, argued that the US had inherited its laws from England. Though England was a Protestant country, he said, it accepted the Doctrine of Christian Discovery—that the first Christian who sights any land becomes its owner, notwithstanding any prior inhabitants on that land. As proof of this, he cited the case of the Cabots, sent out to "discover" new lands for England. So, this Doctrine of Christian Discovery, which encouraged genocide for 5 centuries, is still the Law for all. (Of course, declaring genocide as legal or a religious duty does not, in the least, absolve those involved in these crimes against humanity.)

11.10 False history, slavery, and racism

The genocide which sharply depopulated the American continents created a problem. While the Americas were a convenient destination where the priests could pack off religious dissenters, to live in a state of virtual exile, these were few in number. How to garner wealth from

these vast lands? That required plentiful cheap labour, which was imported in the form of African slaves.

Slavery was a traditional practice in Christian society. During the Crusades, the slaves were mostly Turks captured during warfare. (They were called Slavs; hence the word "slave".) However, the megabusiness of sugar and cotton plantations in America depended upon a very organized and cruel form of the slave trade where Europeans brought slaves in bulk from Africa to America. Brutalized by the Crusades, the Inquisition and the subsequent genocides—all crimes against humanity—the priests could hardly be expected to show even minimal human compassion for these slaves. They extolled these abhorrent acts as the epitome of Christian morality.

The priests themselves owned slaves and participated in this big business. For example, the Archbishop of Canterbury owned the Codrington plantation in Barbados from 1710. Conditions on the plantation were so bad that 4 out of 10 imported slaves died within three years; it was more profitable to work slaves to death, and replace them, than to feed them or take minimal care of them.¹⁷⁹ Being the Society for Propagation of the Gospel, they branded the word "Society" on the chests of their slaves.

These West Indian plantations made huge money for their owners while the going was good. However, when 13 American states seceded from Britain in 1776, this caused a financial crisis. The French-held territory of Haiti had more fertile soil and could produce sugar at $\frac{1}{5}$ th the cost of British plantations. West Indian plantations could not produce sugar at competitive prices, and were unable to function without monopoly right: "in 1775 Jamaica had 775 plantations; by 1791, out of every hundred, twenty three had been sold for debt, twelve were in the hands of receivers, while seven had been abandoned; and the West Indian planters, indebted to the enormous sum of twenty millions..."¹⁸⁰ Naturally, when the British suddenly developed "humanitarian" concerns for slaves (while trying to source sugar from India) they were accused of aiming at French commerce. The situation soon worsened: Jamaica produced at a loss, and the surplus sugar in England piled up.¹⁸¹ Eventually, Britain passed a law against the slave trade in 1833. At this time slave owners such as the Archbishop of Canterbury were paid, and the Bishop of Exeter led all the rest—he received the maximum compensation, for 655 slaves.¹⁸²

Similarly, the American civil war was fought for economic reasons, because the availability of cheap slave labour depressed the wages

of white people in the north who thought "a dollar a day" to be the fair wage. Specifically, Abraham Lincoln had no plans to abolish slavery when he became President, and said as much in his inaugural address. "I have no purpose, directly or indirectly, to interfere with the institution of slavery in the States where it now exists. I believe I have no lawful right to do so, and I have no inclination to do so."¹⁸³ Lincoln abolished slavery only as a last-ditch effort, when he felt that the war was otherwise about to be lost.

Thus, both slavery and emancipation related to greed (or economic causes), not morality. Nevertheless, our concern here is with the way slavery was morally justified. From the 15th to the 18th c., the priests extolled the institution of slavery, and profited from it. They pointed out that slavery was mentioned and accepted in the Bible, in both the Old Testament and the New. The bull *Romanus Pontifex*, not withdrawn to this day, directs Christian kings to turn the non-Christian "Negro" into slaves.

A difficulty developed later on when many of the slaves converted to Christianity. The slaves had little choice, for the slave owners, fearing possible slave revolts, suppressed the traditional African religious practices, and even the beating of drums. On the other hand, the priests found in them a captive audience. But could a Christian enslave another Christian? This presented a moral problem even from the standpoint of the priests who saw no evil in the notion of slavery, or a sadistic hell for non-Christians, or the persecution of non-Christian "pagans", or the Crusades against Muslims, or the Inquisition against Jews and Muslim converts, or the genocide in the Americas against non-Christian "Injuns".

Of course, the church was by then so closely tied to the state that church ideas of morality were quickly adapted to the expedencies of the state. The priests spoke of civil property, not civil rights. For example, Thomas Sherlock, later Bishop of London, assured the planters that "Christianity and the embracing of the Gospel does not make the least difference in civil property".¹⁸⁴

However, theologically speaking, the priests produced two broad answers to the question of Christian slavery. The first was to point to the "curse of Ham".¹⁸⁵ Here "Ham" (or "Kam"), meaning black, was a reference in the Bible to the ancestors of Egyptians.¹⁸⁶ Thus, the story went, God had cursed blacks to be slaves.

The second answer was that the blacks (and reds, browns, and yellows) were such a deprived and savage lot that slavery or other

forms of white domination were actually a matter of advantage for them. The false history that all intellectual achievements were the work of Christians (or their friends, the early Greeks) was used to justify this racist answer.

Traditionally, false history has been an essential element in the arsenal of the church. The church carries out conversions by attacking the self-esteem of the individual: the stock tactic is to use false history to denigrate the group to which the individual belongs. This allows the church to establish its superiority. The church employs thousands upon thousands of people who incessantly recite a litany of these lies. No marketing company today, no TV channel, nor even an entire nation can compete with such propaganda. The propaganda is drummed into the heads of people from childhood through "education"—controlled by the church. Naturally, European intellectuals were supporters or victims of this propaganda.

The leading European intellectuals of the time used false history to justify racism. The philosopher John Locke, a champion of liberty, had invested heavily in the Royal African Company, which had the specific aim of slave trade for the American plantations. He helped to draft the constitution of Carolina, which stated "every freeman of Carolina shall have absolute power and authority over his negro slave of what opinion or religion soever."

The philosopher David Hume wrote in a 1753 essay, "I am apt to suspect the negroes and in general all the other species of men (for there are four or five different kinds) to be naturally inferior to the whites. There never was a civilized nation of any other complexion than white, nor even any individual eminent either in action or speculation. No ingenious manufactures amongst them, no arts, no sciences."¹⁸⁷

Quite unlike the earlier philosophers who taught equity, the priests who took over philosophy used false history to justify inequity, and a belief in their own superiority. Hume's comment was picked up by Immanuel Kant:

Mr. Hume challenges anyone to cite a single example in which a Negro has shown talents, and asserts that among the hundreds of thousands of blacks who are transported elsewhere from their countries, although many of them have even been set free, still not a single one was ever found who presented anything great in art or science or any other praiseworthy quality, even though among the

whites some continually rise aloft from the lowest rabble, and through superior gifts earn respect in the world. So fundamental is the difference between these two races of man, and it appears to be as great in regard to mental capacities as in color... The blacks are very vain but in the Negro's way, and so talkative that they must be driven apart from each other with thrashings.¹⁸⁸

Hegel proposed the negro race as the antithesis of the white race. Samuel Johnson's biographer Boswell wrote a long poem (with footnotes!) in favour of slavery, and addressed it to plantation owners.

"Noodles³, who rave for abolition
Of th' African's improv'd condition⁴,

...

Dont rob from *pure humanity*.¹⁸⁹

Thomas Carlyle ranted against "niggers" "sitting there, up to the ears in pumpkins, and doleful whites, sitting here, without potatoes to eat".¹⁹⁰

Today, the usual apologia for this rabid moralising is that these thinkers were products of their times which left no European untouched by racism and a deep-seated belief in inequity. Without doubt we must reject their sick thoughts and cast aside their books like the other racist products of their times. However, to say that they were the products of their times is to overlook the root cause of their attitude—the false history created for church propaganda—which cause persists till today.

Anyway, the dominant idea used to justify racism was the pseudo-historical thesis that the non-white races were not inventive in arts, science and technology, while the white race was. This belief in white supremacy was but a slight modification of the earlier church belief in Christian supremacy, adapted to suit the then-current economic reality that European prosperity depended upon the labour of blacks in America, who might have converted to Christianity. The notion of "race" gave it a scientific veneer.

The underlying belief continues to this day in a slightly modified form: today it is asserted that science and technology is entirely the creation of the West. Present-day historians like Needham ask why science and technology did not develop elsewhere. That is, Needham echoes the racist historian Rouse Ball and asks why the Chinese did not imitate the supposed demonstrative methods of "Euclid".¹⁹¹ The

focus has again been shifted, from religion or race to “culture” or civilization. This is mere obfuscation, for Toynbee clearly relates Western civilization to Western Christianity. This historical doctrine of the triumph of Christianity is used by present-day military strategists like Huntington,¹⁹² who make clear that it serves the same purpose of supporting the goal of world domination by the same group using the same propaganda.

Earlier, the church had maintained that all ingenuity in science and technology was the work of Christians and friends. During the Inquisition, and the related religious intolerance in Europe, this myth blossomed because individual Europeans were terrified of acknowledging any non-Christian sources. Thus, the two supposedly most creative scientists of Europe were Copernicus and Newton, today credited with the “Copernican revolution” and the “Newtonian revolution”. In fact, today we know that *all* that Copernicus did came from Islamic sources, which he merely translated, without full understanding.¹⁹³ Likewise, the calculus attributed to Newton came from Indian sources,¹⁹⁴ brought from Cochin in India by Jesuits in the 16th c., and used by Europeans who lack a proper understanding of it to this day. The astronomical model of Tycho Brahe came from India, as did the “observations” fudged by the (half-blind) astrologer Kepler. Thus, the claims of Christian/White/Western inventiveness were based on theft and appropriation, just like European prosperity, and it is curious how one sort of theft (of ideas) was used to morally justify another.

11.11 Black Athena

While false history led to racism, there is no doubt that racist historians deliberately falsified history even further. With the persistence of racist attitudes, from the late 18th c. onwards, the Hellenization of history received yet another boost at the hands of racist historians. Martin Bernal explains in the first volume of his *Black Athena: The Fabrication of Ancient Greece 1785–1985* how racist historians in the past couple of centuries systematically suppressed references to Egypt because its inhabitants were black.

In the 16th c., Western scholars had a noticeably different attitude towards Egypt. Simon Stevin, for example, repeatedly spoke of the “knowledge of the ancients” which he aspired to gather. He cited Herodotus to the effect that the Greeks were like children before the ancient Egyptians, and, therefore, the Egyptians had a vaster store of

knowledge. The storyline followed Herodotus who also informs us that Pythagoras and Plato studied in Egypt as he himself did. Therefore, it was rightly believed that pre-Alexandrian Greek knowledge derived from Egypt.

In the 16th c. this attitude towards Egypt was still acceptable. During the Crusades, the prime targets were the Muslims, so Western historians did not care about the contribution of ancient Egypt. However, this attitude changed with the beginning of large-scale African slave trade. The Egyptians were black, as Herodotus informs us, and Western historians now felt ashamed of acknowledging that the now-venerated "Greeks" had learnt from black Egyptians. To get over this sense of shame, they wanted to project the idea that the developments in Alexandria were solely the work of white Greeks. Such a thesis, these historians believed, provided moral justification for slavery, exactly as moral philosophers like Kant had maintained.

So, what we have is a vicious cycle of false history used to justify racism used to reinforce false history. This vicious cycle is supplemented by racist philosophy, and still thrives in our educational system. "Experts" still support this racist thesis with "evidence" which conveniently begs the question. Why, for example, is mathematics taught the Western way, and not the way it developed in Africa, or India or China? The favourite argument of Western historians and philosophers today is that "Greeks" brought in a "rigorous" method of proof in mathematics, which was absent in earlier Egyptian mathematics, and elsewhere in the world. Now, what exactly is the evidence that the "Greeks" actually did anything like that? Certainly, there is no evidence of this sort from Plato to Proclus, both of whom follow the mystery tradition of mathematics from Africa, like Hypatia. The purported "evidence" comes from the suppression of African mystery geometry and Hypatia and the propagation of the false *story* of "Euclid"! The evidence for *that* story comes from a forged passage about "irrefragable demonstration" in a book by Proclus! So, this pompous Kantian argument about the nature of Western mathematics (and its supposed superiority and universality) rests on a forgery! This doctrine of mathematical proof had nothing to do with any actual early Greek tradition. Let us see how it developed during the Crusades.

12 The Christianization of Mathematics

Today people believe both mathematics and Christianity are connected to reason. The first question to ask is this: *How* did Christianity, a doctrine of love, change into a doctrine of reason? *When* did this happen? After all, neither Jesus nor the Bible are symbols of reason.

But stretching and reinterpreting the scripture to suit current political needs is the special skill of priests. For example, creation in the Bible is a seven-day affair which was believed to have happened some 6000 years ago. For centuries, this was interpreted literally, and Sunday is declared a day of rest just because of the belief that God rested on the seventh day. Today, however, many theologians assert that the scientific story of the big bang, regarded as instantaneous creation of the cosmos, billions of years ago, is exactly what the Bible says.

But reinterpreting Jesus as a prophet of reason or the Bible as a gospel of reason would stretch things too far—even the credulous (who believe in hell-fire and brimstone) would find it difficult to swallow. The new age which dawned with the bloody Crusades needed both a new prophet and a new gospel. To understand how and why both were concocted, let us follow the history of the Crusades a bit further.

12.1 The failure of the later Crusades

After the first Crusade, all the later Crusades proved to be continuous military failures. We already saw how the real second Crusade was such a humiliating military disaster that Western history books try to erase it and do not refer to it as a Crusade. Those military failures continued: Im'adudin Zenghi soon liberated Edessa. His son Nooruddin Zenghi

thwarted the (official) second Crusade against Damascus. By the time of his death he had liberated almost all lands conquered during the first Crusade, barring Jerusalem.

His protégé, Salah al Din, scattered the invading Christian forces and liberated Jerusalem as well. Richard the Lion Heart led a third Crusade, but realized he was beaten. While returning he was taken captive, and released only for a huge ransom. The fourth Crusade, which set out with the professed objective to conquer Jerusalem, first attacked Zara to pay their debts to the Venetians. Then, while camping at Constantinople, the capital of Eastern Christendom, the Crusaders set it on fire and took it over. The Crusades were supposedly initiated to protect those very allies! During the fifth Crusade, the Crusaders were trapped and killed in large numbers by the army of al Kamil. They hastily sued for truce, and returned empty-handed.

Despite these failures, the Crusades continued for centuries, in the manner of what Toynbee calls “barbarian incursions”—repeated ineffective attacks by poor and barbaric Christians against the rich and civilized Muslims. However, anyone could see that the Crusades were not about to achieve the agenda of converting Muslims to Christianity anytime soon.

People started protesting, even though, with the combination of Crusades and Inquisition, the Christian priests had unleashed *the* most repressive and totalitarian regimes of terror ever known to humankind. One Guilhem Figueira wrote: “Treacherous Rome,/ avarice ensnares you/ ... Rome, to the Saracens/ you do little damage/ But to the Greeks and Latins/massacre and carnage;”

Brute force had succeeded in converting pagan Europe to Christianity. But force failed against the Muslims, beyond Spain. The priest’s objective of grabbing all Muslim wealth remained a distant dream. Apart from force, there was the scripture. But the Muslims would not accept the Christian scriptures, not even the Old Testament which the Jews accepted. What other way was there to convert the Muslims?

Spies accidentally revealed a way.

12.2 Adelard of Bath: On reason vs faith

Recall that Adelard of Bath was a Christian spy sent to Muslim lands during the first Crusade. He went disguised as a Muslim student, and therefore needed to learn many aspects of Muslim culture.

He found value in this learning. So, after his return to England, he thought of spreading this learning in Christian lands. To this end, he translated the *Elements* from Arabic to Latin, and this translation had considerable circulation.

Why the *Elements*? Why not other books? Because it related to mathematics and reason, then furthest from Christendom. In a separate tract, Adelard of Bath had clearly pointed out how reason challenged faith and authority:

From my Arab teachers I have learnt one thing, to have reason as my guide, while you are dazzled by the show of authority and led by a halter. For what is authority to be called, but a halter? As the brute beasts, indeed, are led by the halter, and have no idea by what they are led or why, but only follow the rope that holds them, so also the authority of writers leads not a few of you into danger, tied and bound by brutish credulity.¹⁹⁵

Recall that within Islam, the Mu'tazilah had argued in favour of reason (actually *aql*), and suggested that *aql*, since it is a faculty given by Allah, should be used to interpret the difficult passages in the Koran. Adelard of Bath repeats this argument, using the (incorrect) word "reason" in place of *aql*:

Unless reason were appointed to be the chief judge, to no purpose would she have been given to us individually [by God]: it would have been enough for the writing of laws to have been entrusted to one, or at most to a few, and the rest would have been satisfied with their ordinances and authority.

It was this kind of thinking which led to the Toledo translations: Christians felt they must acquire Muslim knowledge. This opened a new window of opportunity for the priests. If force and the scriptures had failed against Muslims, maybe knowledge and reason could be used. But exactly how?

Everyone knows how the present pope, Benedict, uses reason against Muslims. His point¹⁹⁶ is that Christians follow reason which is universal, while Muslims are unreasonable. This is the exact opposite of what Adelard thought: that Muslims are reasonable and Christians are unreasonable. How did this remarkable change in perceptions come about between Adelard and Benedict?

12.3 Al Ghazali: Against the philosophers

To understand this, we first need to complete the story of priests and philosophers. We have seen that after the philosophers were expelled from Christendom they shifted to Persia, catalysing the Golden Age of Islam. But, the teachings of the philosophers were eventually attacked by the traditionalists in Islam. Needless to say, this was in the nature of a debate, and not an attack on their persons as happened in Christendom.

A key opponent of the philosophers was al Ghazali (Algazel). His *Maqсад al Falasifa* ("The Aim of Philosophy") was one of the books translated at Toledo, and consulted by Thomas Aquinas. Al Ghazali, who also wrote a famous treatise *Tahafut al Falasifa*¹⁹⁷ ("Incoherence of the Philosophers") against the philosophers, virtually brought to an end the tradition of *falasifa* in Islam.

Ever since Jundishapur, philosophy was tied to holistic medicine: for the physicians there aimed to cure the soul, not merely the body. Thus, a *hakim* was a wise man and also a doctor. However, a doctor could treat a disease only when its cause was understood. Hence, the notion of "cause" became very important for the philosophers. A mechanistic understanding of this notion of cause became popular. Thus, cotton burns when it is brought in contact with fire, so fire was thought the cause of burning.

It came to be believed that everything has such a mechanical cause. This belief created a problem for theology. If everything had a cause, known to the knowledgeable, then the present state of the world would be (mechanically) decided by past causes.¹⁹⁸ This was a special problem for al Ghazali since he believed in continuous creation—that Allah created the world afresh each instant. If the present state of the world is mechanically decided by its past, what is there for Allah to do? So al Ghazali felt that this belief in causes undermined the belief in Allah's creativity.

The belief in continuous creation is nothing as exotic as it sounds to the Western-educated. Thus, al Ghazali was a sufi, who believed in immanence—that is, he thought Allah acts through man. So, denying Allah's creativity would also deny mundane creativity. But this is something we live by every instant of our lives.

If we see a car coming at us, we move out of the way. In the process, we have created a future which, we believe, was not pre-ordained by the past. Every trivial act, such as drinking a glass of water, involves this mundane creativity, as do our attempts to achieve our deepest

aspirations. True, we do many things as a matter of habit, but life would be quite meaningless if we lacked creativity. Given a choice between chocolates and ice-cream¹⁹⁹ one may habitually choose ice-cream, but one is not obliged to do so: one could break the habit. We believe the pen is not the cause of writing, nor is it the hand which holds the pen: we believe the real cause is the writer. Accordingly, continuous creation is a mundane matter which we observe each instant and routinely practise. We believe *we* create (a small part of) the future, and we live all our lives on this belief.

Al Ghazali took this a stage further: he thought the real cause was the divine will, which operated through humans, just as the human will operates through the hand while writing. This is similar to the common belief that the human will is subordinate to the divine will, and Muslims commonly say, “insha’Allah”, meaning “God willing”. Hence, al Ghazali attacked the belief in mechanical causes.

Al Ghazali stated that while Allah *habitually* created smoke with fire, he was not obliged to do so. Thus, one may have always seen smoke accompanied by fire, but this is merely Allah’s habit—he was not compelled to create a world in which fire was always accompanied by smoke. Al Ghazali said, observation only shows that one occurs *with* the other, not *because* of it. Today, we would say that what we observe is a correlation, which does not establish a causal relation. Al Ghazali further said if Allah so chose, he might create smoke without fire, and fire without smoke.

Thus, al Ghazali objected only that this notion of cause placed constraints on the creative power of Allah to create a world according to his liking.

There are many other subtle ways in which al Ghazali examined the notion of cause. Though interesting, we will not get into that here.

Noticeably, al Ghazali did *not* attack reason on grounds of faith. On the contrary, he allowed that Allah was constrained by reason (though not by any laws of cause of effect), and could not create an illogical world. (Al Ghazali remains a key pillar of present-day Islamic orthodoxy.)

Incidentally, from the point of view of mathematical philosophy, this was an important departure from the Platonic view, which regarded mathematical truths as eternal. Proclus argued that the world itself must hence be eternal. Consequently, it must be uncreated—this led to the first creationist controversy over mathematics in the 6th c. For al Ghazali, however, creation was not a one-time affair lasting

seven days, but was a continuous process: at each instant a new world was created, and the preceding one destroyed. So his concern was not with how *long* the world lasted, but with the *kinds* of worlds that Allah could create.

This belief in different *kinds* of worlds is part of everyday language. When we speak of something that “might have been” we refer to a world which is possible, but not real—not the actual world. This notion of *possible* (true in some world) contrasts with necessity: if something is true in all possible worlds, we say it is necessary. Thus, mathematical truths were viewed by al Ghazali as “necessary” truths not in the sense of being true for all time (eternally true), as Plato or Proclus had thought, but in the sense of being true in all possible worlds. This is more or less the way things are seen today in “possible-world” semantics or Wittgenstein-Tarski’s theory of truth, which tries to restore the notion of truth lost by formal mathematics.²⁰⁰

It has gone unnoticed that, from the theological point of view, this was a startling innovation in theological doctrine, for it allowed mathematical truths to bind God, without interfering in creation (whether continuous or a one-time affair). Today, some of al Ghazali’s arguments are credited to the Western philosopher Hume, and regarded as his major achievement. This shows that Hume, like so many Western philosophers and scientists, was incapable of real innovation, and could innovate only by stealing ideas from non-Christians, and passing them off as “independent rediscovery”.

12.4 How the church again changed Christianity

Al Ghazali’s arguments are known to be very strong. But they left many people dissatisfied, including Ibn Rushd of Cordoba. He argued against al Ghazali, though in a very weak and ineffective way which is mostly polemical.

These polemics attracted the attention of Christian priests. They noticed that al Ghazali’s attack on the philosophers, though accepted within Islamic orthodoxy, had nevertheless created a schism between Muslims. They exploited this schism to the hilt (and continue to exploit it today).

During the first religious war, philosophers had resisted the altered Christian doctrine not by force but by means of philosophical arguments to persuade people that altered Christianity was wrong. And people were persuaded and turned against the Christian priests.

Hence, those philosophers were banned from Christendom in the 6th c. But now, after the military failure of the Crusades, the Christian priests took over philosophy. They used the methods of the philosophers not as a path to truth, but as a new tactic in their war against Muslims.

The Western university was started at this time,²⁰¹ for this very purpose of studying the knowledge in Arabic books, to turn it to use against Muslims. The first Christian university—that of Bologna—came up shortly after the fall of Toledo. Later Christian universities, like those of Paris, Oxford, and Cambridge, followed in imitation of Muslim madarsa-s, but with the aim of producing Christian priests who could argue with Muslims. The primary texts used in these Christian universities were those written by Muslim scholars: Averröes (Ibn Rushd) for philosophy, and Avicenna (Ibn Sina) for medicine.

How could Christian universities, meant for the training of Christian priests, use texts written by Muslims? Even in cases such as medicine, this presented a problem: for the Muslim physicians like Ibn Sina or al Razi (Rhazes) were committed to a holistic view of medicine involving both body and soul. However, the Western university changed this to view medicine purely as an instrument for curing the body. (This view of medicine as symptomatic treatment suits big business today.)

Philosophy posed a more serious problem, for philosophers had been banned as heretics. So, what was being studied *had* to be shown to be theologically correct. To this end, Averröes was turned into a mere commentator on Aristotle. Though Aristotle, unlike Euclid, was a real historical figure, he could hardly have written all those texts on philosophy, physics and so on. All the evidence we have for those farcical claims is hearsay from the Baghdad book bazaar, which can be twisted one way or another as one wishes.

For example, Muslim philosophers were greatly concerned with what they called the “theology of Aristotle”. However, Western scholars today dismiss that as hearsay (and heresy) and attribute all those texts not to Aristotle but to Plotinus and Proclus. One can (and ought to) do the same with other texts attributed to Aristotle in our times. For example, how could Aristotle have worked on physics, when doing astronomy invited a death penalty in Athens? Even if Aristotle, unlike Socrates, ran away from Athens and worked elsewhere, how could there have been earlier people doing physics (to whom the book refers)?

However, the priests had a further problem: they feared that the Arabic texts from Toledo—regardless of their imagined historical origin—would undermine their power. That is, it was not enough to make the *origin* of the texts theologically correct, the *contents* of the texts also had to be made theologically correct.

So strong was the fear that the Toledo library was a Trojan horse that, at a Paris council of 1210, almost all the texts of “Aristotle” were proscribed, and people were prohibited from reading them on pain of death. Scholars at the University of Paris, like Siger of Brabant (earlier called “Aristotelians”, but today called “Latin Averroists”), who were enthusiastic about Arabic works, were targeted by the Inquisition. Siger fled Paris only to die mysteriously. Over a period of time this opposition to “Aristotle” was toned down and made more specific: in 1270 and again in 1277, some 232 propositions derived from various Arabic works were banned.

The process of making the texts match the theology involved a two-fold movement: apart from altering the texts (whether their historical origin or their content), Christianity itself changed in this process of absorbing Muslim knowledge. Both al Ghazali and his opponents like Ibn Rushd of Cordoba accepted reason (*aql*), so that reason (*aql*) was uncontested in Islam. This allowed the Christian priests to declare reason as “universal”, and adopt it themselves.

The priests now planned to use this “universal” reason to convert the Muslims. As Aquinas advised Christian missionaries, the Old Testament could be used to persuade Jews, while reason should be used with Muslims.

However, before the priests could use reason as a weapon against Muslims they had to first make it *their* weapon. This required another alteration in church doctrine: Christianity was again changed. The resulting alteration, which I call post-Crusade Christian theology (to clarify its social cause in the Crusades), is also known as the Christian rational theology of Aquinas and his schoolmen. The adjective “Christian” is necessary to distinguish it from the similar Islamic rational theology or *aql-i-kalam* which it copied.

Christianity, which earlier had nothing to do with reason, and was founded entirely on faith, was now declared a doctrine of reason. Faith, meaning uncritical belief in the infallibility of the Christian priest, of course was the key to achieving this transition! The priest was so feared and powerful a figure in the West that in so many centuries no

one dared question this change in Christianity from a doctrine of love to a doctrine of reason.

The *Elements* became the new gospel of reason. The book had once been used to attack post-Nicene theology (or the first alteration in Christian beliefs). The priests now wanted to turn around the *Elements* to use it to attack Muslim beliefs. Of course, it would never do to allow that Hypatia or Theon was the author of the new gospel of reason. (And the army of priests today is still trying to establish that Hypatia or Theon had nothing to do with the *Elements*.) An early Greek called Euclid about whom nothing was known ideally fitted the bill as the author of the new gospel. Any old story would do. As we have seen, at one time the story was that of Euclid of Megara who, like Aristotle, was a contemporary of Plato.

This, then, is the real importance of “Euclid” and the *Elements*. This new prophet and new gospel anchored the change in the church doctrine to the Christian theology of reason (as distinct from the Islamic philosophy of *aql*). These theological manoeuvres transformed mathematics.

Though the church adopted “reason”, and declared it universal, this “reason” meant something different to Muslims and the philosophers. Thus, the equivalent term among Muslims was *aql*—which relates to human intelligence and includes human creativity. The philosophers regarded reason as a window to the soul. The church certainly had rejected the philosophers’ (and early Christian) notion of soul. Nor was the church sympathetic to human creativity implied in *aql* (though it had a doctrine of uncreative “free will” to justify the doctrine of sin). Therefore, “reason”, as understood by the church, and as propagated in the West, refers to a mechanical and sterile means of proving something or persuading others—for “persuading” others was the only thing the church was interested in.

12.5 How the church changed mathematics

How did the *Elements*, a religious book which refutes point by point the first alteration in Christian doctrine, come to be acceptable to the priests (after the second alteration of Christian doctrine)?

In a way this is not something to be marvelled at, for the priest can reinterpret anything to mean something else! Christianity, which originally was a doctrine of universal love, was reinterpreted by the

priest as supporting slavery, genocide, and the tortures of the Inquisition (all of which contributed only to the Christian priests' unbridled lust for power). It was through such a process of reinterpretation that the Bible, which meant one thing to Origen, came to mean something altogether different in later times.

Recall that Origen's understanding of Christianity was very similar to the philosophy of Theon, Hypatia or Proclus, and they came from the same school. Origen understood the Bible, in spiritual and symbolic terms, as a mystery, exactly as Proclus understood the geometry in the *Elements*. If the Bible could be reinterpreted, why not the *Elements*?

Many changes which had already taken place in Christian doctrine facilitated this reinterpretation. Thus, consider the issue of images. The second Council of Nicea had already (in 787 CE) approved the use of images. Priests, in fact, now *required* that idols and relics be part of each church, as can be commonly seen today. The Christian priests now claimed that they were only against idols of "strange gods"—so abstract geometric figures did not bother them anymore.

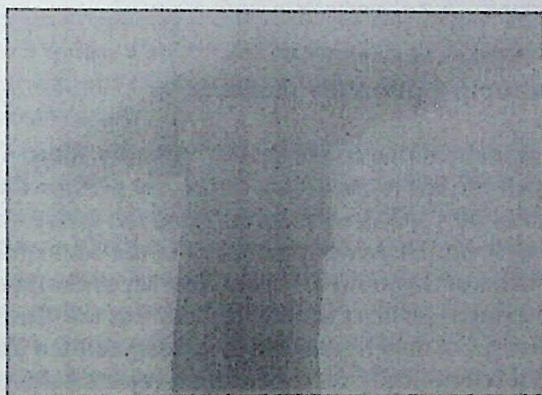


Figure 12.1: The largest idol of Jesus, in Rio de Janeiro. This hazy-looking "mistical" photo of Christ the Redeemer ("Corcovado in the clouds") symbolizes the mystical nature of Christ with his back turned to the world! Return to the belief in the mystical Jesus would help to liberate Christians.

Similarly, equality was made irrelevant, by disconnecting mathematical equality from political equality. In line with this reinterpretation, the text of the *Elements* was gradually changed. Thus, the very word "equality", used throughout the *Elements*, eventually came to

be thought so wrong a word that it was replaced by “congruence” by David Hilbert by the 20th century—and “congruence” is the word used in current school texts on geometry.

In the process, mathematics was transformed: from “the science of learning” or the “science of arousing the soul” to “a method of compelling argument”. That is also how mathematics is taught today, as a doctrine of proof. The special thing about this deductive proof (or axiomatic-deductive method) is that it is purely metaphysical. Western philosophy believed that such metaphysical proofs are “perfect” and infallible, in contrast to empirical proofs which are fallible. It is this later-day Christian understanding of mathematics, as a means of “irrefragable demonstration”, that is incorporated into the interpolated passage in Proclus’ *Commentary*. Proclus, who aimed to stir the soul, had no need of “irrefragable demonstration”. This was a “need” specific to the church after the Crusades failed militarily. The philosopher’s idea of *knowledge as wisdom*, through deep introspection, was transformed into the priest’s idea of *knowledge as power*, through persuasion and sophistry.

12.6 Doctoring primary sources

Apart from reinterpreting the texts, the “primary sources” were doctored to match the reinterpretation. Thus, the present-day “primary source” of “Euclid’s” *Elements* is taken to be the text established by the scholar Heiberg. He noticed that most of the texts of the *Elements* related to Theon or mentioned Theon. The key criterion of selection of his manuscript as primary source was that this was the only known Greek manuscript of the *Elements* which did *not* mention Theon! (Had he proceeded scientifically, he should have rejected this manuscript as an outlier!)

This process of doctoring primary sources to match a convenient reinterpretation of the text was by no means novel or unfamiliar to Western scholarship. Even the Bible was extensively doctored, to match its politically convenient reinterpretations. Some honest scholars like Isaac Newton pointed this out, but their work was suppressed for centuries. The earliest Bibles in Aramaic, available in India, would also have given away this process of doctoring. But, we have seen (p. 81) that those original sources were burnt by Europeans, to hide the evidence of tampering, since those Bibles were irreconcilable with

the Bible and the understanding of Christianity then prevailing in Europe.

Thus, the post-Crusade appropriation of reason by the priest brought an end to the war between the priests and the philosophers, when the Islamic theology of reason (*aql-i-kalam*) was absorbed into Christian rational theology—after making it theologically correct, and eliminating most of the things dear to the philosophers. In the end, the church's embrace proved to be deadlier for philosophy than its earlier persecution of the philosophers!

12.7 The religious bias in Christian (and formal) mathematics

But, how *exactly* did all this bring in a religious bias in present-day mathematics? Isn't it still true that $2+2=4$? Let us try and understand this more carefully.

Recall the answer to the Epicurean ass. Likewise, the mathematician today would say that any ass knows *that* $2+2=4$, but only the mathematician knows *why* it is true, for he has a *proof*. In other words, mathematics today, also known as formal mathematics, is primarily about proof, not calculation—that, at least, is what present-day mathematicians claim.

This elevation of proof above calculation faithfully reflects the social circumstances of Christian priests during the Crusades. *They* had little use for calculation (except to calculate the date of Easter). Pope Sylvester's blunder in understanding the Indian numeral system amply demonstrates how very bad they were even at that calculation (which they didn't get right until 1582). What they needed for conversion was a means of convincing argument. Those were not the circumstances elsewhere, as in India or China, where mathematics was done for calculation and not proof. It is not, therefore, appropriate that racist historians like the Rouse Balls (and Needhams) of this world dismiss it as non-mathematics. If they had any commonsense, they should have rejected Western mathematics as useless theology, not real mathematics of calculation.

Note also the present circumstances: scientists and engineers today use mathematics for calculation, and don't much care about proofs, especially in frontline areas like high-energy physics.²⁰²

However, let us suppose, for the moment, that mathematics is indeed about proof and not calculation. But what *sort* of proof?

Thus, there are a wide variety of proofs. Scientific proof, for example, is based on experiment. This sort of proof is called empirical (or physical) proof, and science is regarded as superior to metaphysics just because it uses this sort of proof. This sort of proof is accepted not only by scientists, but by others too: for example, by Hindus, Buddhists, Jains, Muslims. Indeed, this is the *only* means of proof commonly accepted by *all* Indian systems of philosophy.

So, how should one *prove* that $2 + 2 = 4$? Many people will try to prove this by lining up two objects with two objects and showing that this makes four objects. This is the “normal” mathematics they learnt in childhood. One learns the meaning of the word “dog” by pointing to various instances of dogs, and likewise, one learns the meaning of 2 by pointing to various instances of two objects: two fruits, two stones, two goats, etc. However, the formal mathematician would object that this is a *physical* proof, not a mathematical proof which *ought* to be metaphysical. He will further argue that physical proofs are fallible: one might mistake a rope for a snake or vice versa, to use a classical example from Indian philosophy.

The formal mathematician will demand that one should *mathematically* prove $2 + 2 = 4$, starting from some axioms such as Peano’s axioms. Most people don’t really know what a mathematical proof is nor what Peano’s axioms are. They were never taught. So, they are left groping in the dark and can do nothing better than to rely on mathematical authority, like brutes, as Adelard said.

This is where the problem begins. What is required is not proof as most people understand the notion of proof, but a special metaphysical proof on Christian principles. Why *ought* a proof to be metaphysical? This requirement is contrary to Hindu, Buddhist, and Jain thought. Indeed, it is contrary to all systems of Indian philosophy which unanimously accepted the empirically manifest (*pratyakṣa*) as the first means of proof.²⁰³ If empirical proofs were to be accepted, would that change mathematics? Indeed it would: for the “Pythagorean theorem” can be proved in one single step, as was done in Indian manuscripts like the *Yuktibhāṣā*, as in Fig. 13.1. This is a physical means of proof, for it involves cutting a figure and moving it about in space. Allowing such proofs would make the *Elements* worthless, for the “Pythagorean theorem” comes at its end.

So far as applications of mathematics to science are concerned, such empirical proofs are not only acceptable, they are *more* acceptable than metaphysics; for science, too, accepts physical observation as

the key means of proof. It is true that empirical means of proof are fallible. But, in that case, we repeat the observation more carefully. For example, we prod the rope/snake with a stick to check whether it moves on its own when prodded. Indeed, the fault lies with the religious claim of infallibility that is made on behalf of Christian metaphysics, for there is no infallibility in this world, neither of the pope nor of any particular method of proof, and those who claim it are playing a con-trick.

The con-trick in this case is clear enough. It is being claimed that Christian metaphysics is (or ought to be) universal. Of course that is not factually the case, and everybody knows it. Even from the remarks of Rouse Ball or Needham, it is already clear that the claim that metaphysical proof is universal is not factually true. It is normative. It is simply an unjustified *demand* of Western scholars that everyone should use Christian metaphysics! One can equally well ask, why didn't Christians do geometry like everyone else? Something must have been wrong with them!

Apart from the value attached to empirical proofs, there is the question of the logic used in the proof. The logic underlying "reason" is an aspect of metaphysics. It is commonsense that metaphysics can never be universal. However, the racist philosopher Kant foolishly claimed, in the preface to his famous book,²⁰⁴ that logic had reached perfection since it had changed little since Aristotle. Of course, the logic he attributed to "Aristotle" actually comes to us from texts translated at Toledo, and very likely involves inputs from India.²⁰⁵

In any case, from even before Aristotle of Stagira, Alexander's teacher, there were multiple systems of logic prevalent in India. The Buddha, for example, used the logic of *catuṣkoṭi* (four alternatives). Likewise, his contemporary, Mahavira, and the Jains used a logic of three alternatives or perhaps-ism (*syādvāda*). Many mathematical proofs today use a technique called proof by contradiction. These proofs would all fail with Buddhist or Jain logic. Asserting the universality of Christian metaphysics thus involves a further religious bias against Buddhism and Jainism. On the other hand, if logic is decided not culturally but by appeal to physics, then physical proofs should be acceptable. Even so, quantum logic is very similar to Buddhist logic,²⁰⁶ so it is not clear that if physics is used to decide logic, the verdict would be in favour of the logic declared "universal" by Christian metaphysics.

Apart from the incorrect belief that mathematics is infallible and universal, the West has incorrectly believed that mathematics is exact. Now, at the crude level of integer arithmetic, on an abacus, one could imagine that mathematics is exact. In practice, the inexactitude lies in the objects being counted, like stones which can be broken, for there is no exact definition of what is a stone. Where the objects are not standardised, like potatoes or fish, where there can be big fish and small fish, a problem arises in just counting. Do 2 big fish and 2 small fish make 3 big fish or 5 small fish? To overcome this difficulty due to lack of standardisation one would typically make a finer discrimination by weighing them. In this case 2 big fish + 2 small fish may equal 3.2 big fish. If the objects being compared are gold coins, one would use a finer balance and finer weights to discriminate between 3.23 kilos and 3.28 kilos, which difference (of 50 grams) could easily be worth a small fortune. However, in general, when weight or length measurement is involved, exactitude is impossible. One can only go to so many decimal places, with so much margin of error, beyond which one typically does not care. For fish or stones, 100 grams more or less may not matter. For gold the "don't care" limit may be a few micrograms. Likewise, the length of the diagonal of a unit square cannot be exactly measured. One can only write it down to so many decimal places. The philosopher Descartes wrongly thought this problem applied only to the ratios of curved and straight lines.

In present-day mathematics these difficulties are typically handled by postulating a metaphysical way to handle infinity, as in set theory. This creates its own complications. We will not get into that here. Suffice it to say that a computer does not understand those axioms (Peano's or those of set theory) and can never implement even Peano arithmetic: nevertheless, most calculations of any practical importance can be done on a computer.

12.8 The religious bias: from mathematics to science

The religious bias in present-day mathematics creeps into physics in various ways. Let us see some examples.

First, let us see how Christian rational theology affected the very concept of science. Al Ghazali had argued in favour of continuous creation, which came to be called "providential intervention" in Christian theology. However, Christian theology went literally by the Genesis

account of creation in six days. So, what did God do after that? Contrary to al Ghazali, Aquinas and his schoolmen rejected providential intervention. They claimed that God subsequently ruled the world with *eternal* laws.

the very Idea of the government of things in God the Ruler of the universe, has the nature of a law. And since the Divine Reason's conception of things is not subject to time but is eternal, according to Proverbs 8:23, therefore it is that this kind of law must be called eternal.²⁰⁷

Now the transformation of mathematics by Aquinas and the schoolmen was half-baked. They continued to believe that mathematics incorporated eternal truths though this no longer had any rationale, since mathematics was now disconnected from the philosophers' belief in an eternal soul.

Anyway, because the belief in mathematics as eternal truth lingered on, it came to be believed that the eternal laws of the world were written in the language of mathematics. That is, people came to believe that the Bible was the word of God while nature was the work of God, and the latter book (of nature) was written in the language of mathematics.

Newton, a deeply religious person, thought of himself as a prophet (he believed he was born on 25 December, because he followed the wrong Christian calendar). He thought God had revealed those laws to him: in his notebooks, he cancelled the word "hypothesi" (hypothesis) and replaced it with the word "lex" (law). Now, Newton's laws failed over a century ago—they may still remain practically useful for calculations in ballistics, etc., but they are certainly not any sort of universal "laws". Nevertheless, they continue to be taught as "laws" to school children to predispose them into believing in the post-Crusade Christian theology of natural laws. This deliberate propaganda is then also used against Muslims, by claiming that Islam has fallen behind the West in science just because (al Ghazali) does not believe in laws of nature.²⁰⁸

Even more interesting is the reason *why* Newtonian physics failed, and had to be replaced by relativity (and quantum mechanics). This related to Newton's religious beliefs about mathematics as follows.

The calculus first developed in India as a sophisticated technique to calculate precise trigonometric values needed for astronomical models. These values were precise to the 9th place after the decimal

point; this precision was needed for the calendar, critical to monsoon-driven Indian agriculture.²⁰⁹ This calculation involved infinite series which were summed using a sophisticated philosophy of ratios of inexpressed numbers.²¹⁰

Europeans, however, were primitive and backward in arithmetical calculations, as we have seen, and barely able to do finite sums. The decimal system had been introduced in Europe by Simon Stevin only at the end of the 16th c., while it was in use in India since Vedic times, thousands of years earlier. Unable to understand the sophistication underlying the Indian calculus, and driven by their pompous sense of superiority, leading European philosophers and mathematicians like Descartes again blundered. The Indian calculus used infinite series to compute the ratio of the circumference of the circle to its diameter, a number today called π . Descartes reasoned that if the infinite series were summed term by term this would take an infinite amount of time. But if we stop at any term the sum would not be perfect, hence not mathematics. Hence, he declared²¹¹ that calculating such ratios of curved and straight lines was beyond the human mind! In contrast, in India, children were taught how to measure curved lines with a string, and compare that with the length of a straight line by straightening the string.

Newton thought he had a grand answer to Descartes' difficulties. This was called "fluxions" because it involved a belief in the smooth flow of time.²¹² This required time to be metaphysical, contrary to the clearer thinking of his mentor Isaac Barrow, who insisted that time should be thought of in physical terms.²¹³ Making time metaphysical (and consequently unmeasurable by physical devices) was a mistake: it was the mistake which resulted in the failure of Newtonian physics.²¹⁴

Thus, the religious belief in mathematics as eternal truths led to the belief that it had to be perfect. This directly led to the error in Newtonian physics because Newton tried to make the calculus "perfect", by making time metaphysical. This error was partly corrected by relativity which defined a physical measure of time by postulating that the speed of light is constant.

However, let us not imagine that this intrusion of religious beliefs into science through mathematics applies only to the past. One can easily find it in present-day science. Let us see how this happens with Stephen Hawking's "science".

To begin with, let us notice that Aquinas' idea of a world ruled by eternal laws was a half-baked idea, in another way. How can the

world be created and still be ruled by *eternal* laws? Such incoherence is common in theology, for the difficulties that theology has to overcome are insurmountable. Nevertheless, this did not touch the faith of people who believed in both for 8 centuries. Similarly, for the last 8 decades, theologians have been championing the idea of the big-bang cosmology as the Christian view of creation, overlooking the incoherence in maintaining that creation was instantaneous and also a six-day affair.

Now, people commonly confound the big bang with an instant of creation. But the big bang is only a dense state of the cosmos in the past. It may not be a moment of creation because the cosmos may go through cycles (including cycles *of* time). Stephen Hawking set out to prove that science is consistent with Christian theology. He started off by presenting the curse on "cyclic" time as a postulate: the so-called chronology condition. He used the same wrong arguments as those of Augustine to make this postulate plausible.²¹⁵

He then claimed to have *mathematically proved* that the big bang would correspond to a moment of creation or singularity. He interpreted this conclusion as follows: the laws of physics would not be eternal but would break down at this moment of creation. This connection between singularities and (the Christian notion of) creation was made perfectly explicit by Hawking himself: "... the actual point of creation, the singularity, is outside the scope of the presently known laws of physics".²¹⁶

The connection of a singularity with creation is made even more explicit elsewhere by Hawking: "At the big bang and other singularities, all the laws would have broken down, so God would still have had complete freedom to choose what happened and how the universe began." This is, of course, pure bunkum, as I have explained elsewhere.

The point here is that the singularities of Stephen Hawking and Roger Penrose are nothing more than infinities arising from a bad mathematical understanding of the calculus.²¹⁷ But they are used to peddle all sorts of dangerous theological conclusions.

Here is an easy way to see that this is bunkum. The physicist Tipler wrote:

the central claims of Judeo-Christian theology are in fact true, ... these claims are straightforward deductions of the laws of physics as we now understand them. I have been forced into these conclusions by the inexorable logic of my

own special branch of physics... the area of global general relativity... created... by the great British physicists Roger Penrose and Stephen Hawking.²¹⁸

In this book, called *Physics of Immortality*, Tipler advertises that he must be taken seriously because he has published papers on this subject in various scientific journals including the prestigious journal *Nature*.

This illustrates how the Christian bias in present-day mathematics creeps into present-day science.

13 Euclid Goes to School

How did the *Elements*, a venerable book which participated in two religious wars across a thousand years, come to be regarded as a secular text for pre-high-school children?

That brings us to the final ironic twist to the story of priests and philosophers, which came about when modern-day philosophers like Bertrand Russell further changed the *Elements* in a way that supported the priests.

This support for the priests was not quite intentional: Russell spoke out freely against the church, and against the wars generated by religious beliefs. He explained why he did not consider himself a Christian. However, like anyone else, he was susceptible to the myths and social circumstances prevalent in his time. Specifically, he was a victim of the myths of Hellenic prowess amplified by racist historians. The philosophers who preceded Russell—David Hume, Immanuel Kant, Hegel, Thomas Carlyle—didn't they all speak with one voice that other races were not inventive? Even people like Newton and Nietzsche, who were staunchly opposed to the church, still fell victim to its propaganda.²¹⁹ So, while Russell may be blamed, he should not be singled out for blame.

We have seen that the notion that mathematics is metaphysical proof actually originated from post-Crusade theology. However, it was wrongly attributed to the *Elements*. In fact, we saw that that notion of mathematics did not fit even the first proposition of the *Elements*. Because theologians constantly build and defend all sorts of absurd stories, they tend to sideline facts. Consequently, thousands of leading Western thinkers, across eight centuries, failed to spot this elementary mismatch between story and facts!

The mismatch was noticed only in the 20th c. So what was to be done? Since theologians (more pompously called metaphysicians) have always regarded facts as inferior, they just changed the facts!

That is, when the myth about Greek mathematics as proof did not fit the *Elements*, they rewrote the book! This is the typical way in which theology proceeds, from metaphysics to facts. When the facts don't fit the interpretation of a key book like the *Elements* or the Bible, it is the books which are adjusted to fit.

What one should learn from the above history is that the very process of deprecating empirical facts, so popular with Western theologians, is wrong; it is bound to fail again and again, and yet again. Thus, the 20th c. reinterpretation still does not fit the rewritten book! To understand this misfit, first, let us understand how and why Russell and David Hilbert rewrote the *Elements*.

13.1 Indian proof of the "Pythagorean theorem"

Recall the story that Pythagoras discovered the theorem named after him, which is the last (or second-last) theorem of the *Elements*. The "Pythagorean theorem" says that in a right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on its sides. There is ample evidence that the Egyptians, Chinese, and Indians all knew the theorem long before Pythagoras. (In fact, Indian texts such as the *śulba sūtra* clearly went further and gave a method of *calculating* square roots, a method unknown in the West for the next 2000 years or more.)

The new thing, it has been argued, was not the *fact* of the "Pythagorean theorem", which was widely known, but its *proof*. Now, how *exactly* did Pythagoras prove the theorem? No one knows. In fact, we have no evidence that Pythagoras (if he existed) had any sort of proof at all! That is just another story!

Even a thousand years after Pythagoras, Proclus speaks only of a *rumour* that Pythagoras sacrificed an ox when he found the proof of this theorem. The symbolism of an ox (or the bull, Apis) suggests that even the *talk* of that rumour might be just another little mystery story, not to be interpreted literally! Nevertheless, in another 1500 years, that story about a rumour has graduated into one of the founding pillars of the Western history of mathematics. Such is the stuff that Western history is built upon!

But that is not the end of the false story. The "Pythagorean theorem" says that in a right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on its sides. The typical Indian way to prove this is to draw a figure of a right angle with the squares on

the hypotenuse and the sides. One then cuts the figure and rotates the pieces as shown to conclude that the two areas are, in fact, equal. Clearly, the proof of the "Pythagorean theorem" is *very* easy if one is either (a) allowed to make measurements, or, equivalently, (b) allowed to move figures about in space. (Thus, to make a measurement, one must, for example, move a ruler to align it with the line segment or object being measured.) Non-Western geometry allowed both.

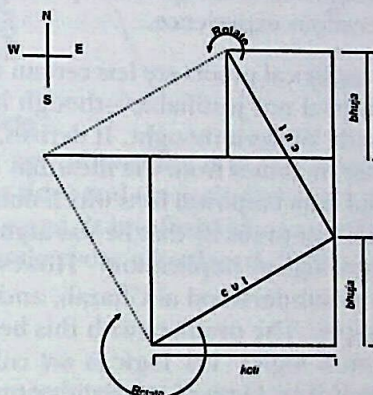


Figure 13.1: We start with the right-angled triangle at bottom right. We then construct squares on the hypotenuse and the large side (*koṭi*) as shown. The square on the smaller side (called *bhujā*) is placed on top of the *koṭi*-square, as shown. We then measure out a distance equal to the *bhujā* from the bottom right corner. We cut along the lines, as indicated, and then rotate the triangles to form the larger square from the two smaller squares. This proof of the "Pythagorean theorem", from the Indian text *Yuktibhāṣā*, is an example of physical proof.

It is just because the proof is so easy that, in Indian texts on mathematics,²²⁰ which *do* permit measurement,²²¹ it is the *first* proposition, not the last proposition as in the *Elements*.

13.2 The Western objections to the Indian proof

The present-day mathematician will jump up to object that this proof involves an empirical procedure which should not enter mathematical proof.²²² Why not? As the racist philosopher Kant explained,

an empirical proposition cannot possess the qualities of necessity and absolute universality, which, nevertheless, are the characteristics of all geometrical propositions.²²³

As Schopenhauer further added, seeing two figures coincide was not proof. Why not? Because,

... coincidence is either mere tautology, or something entirely empirical, which belongs not to pure intuition, but to external sensuous experience.

This belief that empirical proofs are less certain than metaphysical ones is neither universal nor justifiable—though it is a belief which pervades post-Crusade Western thought. It derives, like racism, from theology. In this case, it comes from the idea that logic which binds God is more powerful than empirical facts which don't. Al Ghazali had made that concession just to clarify that he was arguing against causal implication, and not logical implication. However, post-Crusade Christian theology misunderstood al Ghazali, and made this into a vast universal principle. The problem with this belief is made clear by the question: *which* logic? For logic is *not* culturally universal. For example, the Buddhist logic of *catuṣkoṭi* is not 2-valued. Nor is logic empirically certain (e.g. quantum logic is not 2-valued).²²⁴ This shows that the Western idea of mathematics as metaphysical proof is untenable, but let us give it a long rope.

Let us play along and suppose for the moment that there is something wrong in the notion of empirical proof in non-Western cultures, and that a proper mathematical proof ought to be metaphysical and non-empirical.

Well, then, *where* does one find a proper proof of the “Pythagorean theorem”? Does one find it in the *Elements*? Unfortunately, no. The proof of the “Pythagorean theorem” in the *Elements* depends in an essential way on the proof of another theorem. This is the fourth proposition of the *Elements*, also known as the Side-Angle-Side theorem, or SAS theorem for short. This says that if two triangles have two sides and the included angle equal, then the two triangles are equal. In *all* known versions of the *Elements*, the SAS theorem is proved by moving one of the triangles in space and “applying” it to the other triangle to show that the two coincide. Thus, the proof of the “Pythagorean theorem” found in the *Elements* is not fundamentally different from the proofs found elsewhere in the world, except that it is very much more prolix.

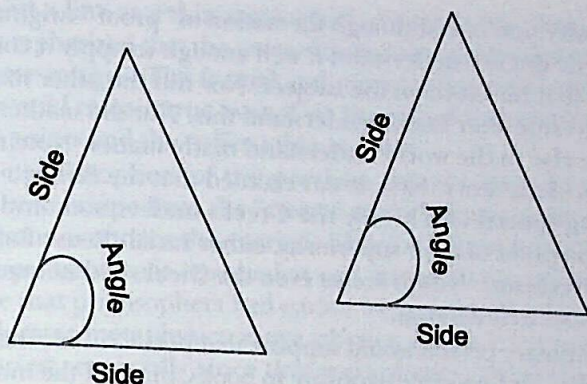


Figure 13.2: The key proposition 4 in the *Elements* says that if two triangles have two sides and the included angle equal, then the two triangles must be equal. It is called SAS as an abbreviation for “Side-Angle-Side”. In modern-day school texts, SAS is not a theorem, but a postulate.

Thus, if this procedure of moving figures about is permitted for the 4th proposition (SAS), then the “Pythagorean theorem” (47th proposition) too can be similarly proved in a single step, as we have seen. Why, then, go through those 46 intermediate propositions when an easier proof is available? This is a simple difficulty which any school child can spot, and my teacher had no answer to this question.

13.3 How Russell and Hilbert rewrote the *Elements*

This was the question to which Hilbert and Russell tried to provide an answer at the turn of the 20th c. They held that the proof of the SAS theorem was wrong. To be precise, Russell called it a “tissue of nonsense”.²²⁵ In fact, it came to be believed that the SAS theorem could not be proved at all, and that it could only be *assumed*, as a postulate. So, the current consensus among (Western) mathematicians is that the proof of the “Pythagorean theorem” in the *Elements*, and, indeed, the *Elements* itself, was fundamentally defective all these centuries—defective in an obvious way. Not only did all others in the world get mathematics wrong because they did not imitate the *Elements*, even “Euclid” and the *Elements* got it wrong!

The story now is that though the notion of "proof" originated with "Euclid", he did not understand it well enough to apply it correctly in the book that he wrote on the subject! Nor did the other mathematicians who came after Euclid understand this. Nor did mathematicians anywhere else in the world understand mathematics. Note the twists and turns of the story. First, it was claimed that the *Elements* involved something special which only the Greeks understood, and this was paraded as proof of their superiority, either racial (Rouse Ball) or otherwise (Needham). Now it seems even the Greeks did not understand mathematics well enough!

The ordinary person would suppose that post-Crusade theologians, because they had no prior exposure to books, misread the intention of the author of the *Elements*. But the theologian is not about to concede that—it would mean that the post-Crusade Christian theology of reason was founded on a blunder. So, the story now is that though the Western theologian correctly assessed the intentions of "Euclid", it was "Euclid" and all others before and after him who made a mistake in executing that intent. The theologian clearly is very comfortable talking about the imagined intentions of the imaginary author of the book, as a way to dodge the actual facts of the book.

20th c. mathematicians claim that they have finally understood this defect in the (writing of the) *Elements*, and remedied it by changing the SAS *theorem* into the SAS *postulate*. This is how it is taught in current school texts (in India since about 1970).

Thus, what Hilbert and Russell did at the turn of the 20th c. CE, in their respective books on the *Foundations of Geometry*,²²⁶ was to eliminate the reliance on the empirical as a means of proof.

Now, meaning ultimately derives from a reference to the empirical world. The meaning of the word "dog" is most easily explained by pointing to an instance of a dog. Likewise, the meaning of the word "point" is often explained by pointing to a dot on a piece of paper. Eliminating the empirical also eliminated meaning from mathematics. That is why it is called formal mathematics.

To put matters in another way, the essence of the correction to the *Elements* proposed by Russell and Hilbert was this: that mathematics is all form, and is entirely devoid of meaning. Russell summarised this in one sentence: "In mathematics we never know what we are talking about."²²⁷

Hilbert explained with an example about coffee mugs. In geometry, one is accustomed to thinking of a point as a dot on a piece of

paper, and a line as a thin mark which connects two dots. However, Hilbert emphasized that the propositions of geometry did not depend upon these images. The formal and meaningless propositions of geometry would remain true even if we thought, for example, of coffee mugs as points and the coffee table as a line.

Some philosophers of the previous century thought this was a clever way to escape from the "eternal truths" proposed by Plato, and the religious overtones this carried. This must have made the priests very happy, because it removed at one stroke all the mysterious significance that philosophers had earlier assigned to the *Elements*. This belief elevates metaphysics above physics, which is very convenient to the priest, especially since that metaphysics, as we have seen, is biased.

13.4 Where Hilbert and Russell went wrong

But that too is not the end of the story. For, even after the SAS theorem is changed into a postulate, difficulties persist. Another formal mathematician, Birkhoff, proposed different axioms. The two sets of axioms proposed by Birkhoff and Hilbert have been called the B-revision and the H-revision of the *Elements*. Both are part of formal mathematics. The B-revision has a notion of length or distance (defined axiomatically, not by actual measurement) and is hence called metric. All the theorems of the *Elements* remain valid, but the proof of the "Pythagorean theorem" (and the book *Elements*) again gets trivialised. On this view, whoever wrote the *Elements* was, indeed, asinine, for that prolixity was unnecessary.

The H-revision had anticipated this difficulty. Hence, it disallowed length measurement, and is therefore called synthetic. We remarked earlier how the reference to political equality was eliminated by Hilbert by renaming "equality" as "congruence". But, this is not a valid interpretation of the *Elements* after proposition 34 which speaks of equality of *non-congruent* areas.

Like Humpty-Dumpty fallen off a wall, this difficulty cracks the H-revision of the *Elements* down the middle: it is no longer possible to make sense of the propositions in the *Elements* beyond the 34th proposition. Proposition 34 says that parallelograms on the same base and between the same parallels are equal. In the straightforward empirical sense, this means equality of areas, which presents no difficulty in understanding. But there is a difficulty for the H-revision which

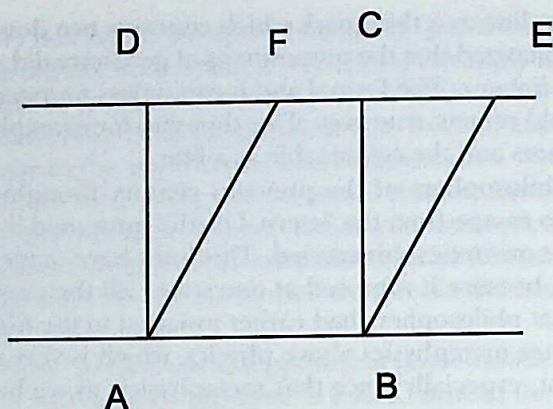


Figure 13.3: Proposition 34 of the *Elements* says that parallelograms on the same base and between the same parallels are equal. The figure shows two such parallelograms: the rectangle ABCD and ABEF. The proposition is clearly about equal areas, and this proposition is used to derive the well-known formula for the area of a triangle as $\frac{1}{2}$ base $\times$ height, by regarding the triangle as half of a parallelogram, and equal to half a rectangle. Hilbert's reinterpretation of equality in the original *Elements* as congruence fails for this proposition since it concerns incongruent areas.

disallows length measurement. Thus, this proposition marks a subtle shift in the notion of equality, which can no longer be interpreted to mean congruence, and must be taken to mean equal areas.

Indeed the "Pythagorean theorem" is a theorem about the equality of areas, and comes after this. Therefore, for the theorem to be even stated, area measurement must be presupposed. Normally, area measurement presupposes length measurement. It is possible, of course, to defend the H-revision by advancing a new hypothesis: while *length* measurement is disallowed, area measurement is allowed! This is an extremely artificial state of affairs—to allow measurement of area, but not of length! It is time to recall the old trick: any story can be defended against any facts, for any length of time, by constantly advancing hypotheses. The falsehood of the theory is apparent from the constant need to keep advancing new hypotheses.

Formal mathematics brought about another key change. While the word *aql* means creative intelligence, Hilbert's notion of reason was purely mechanical. A mathematical proof today is, by definition,

something which can be *mechanically* checked, by a machine or a moron.

Following the recommendations of the US School Mathematics Study Group,²²⁸ this is the way in which the *Elements* has been taught to school children for the last half-a-century. Mixing mathematics with metaphysics has made mathematics very counter-intuitive. Consequently, mathematics, the science of learning, which facilitated learning, has today become the most difficult subject to learn!

Epilogue

We can now put together all the pieces in chronological order. The tradition of mystery geometry or mathesis, which connected geometry to deep religious beliefs and *practices*, began in Egypt, in Africa, from where the Greeks learnt it.

That African tradition involved an underlying belief in the oneness of humanity, and of equity. This belief was propagated by the learned philosophers of Alexandria who maintained the Great Library of Alexandria. That library was seeded by Alexander's loot of books, and it incorporated books from across the world. Some of these were translated into Greek by the philosophers. Egyptians encouraged learning for they regarded knowledge as the window to the soul and a means of virtue. But they imparted this real learning only to a tested few. The derived writings of Greeks like Plato spread this knowledge to all and sundry.

Early Christian beliefs were strikingly similar to those of the Egyptians and the philosophers (today called "Neoplatonic"). This similarity extended to beliefs about the soul, and even to the understanding of Jesus Christ (Iesu) as a mystical figure who resembles Osiris (Ausar). However, in the 4th c. CE Christian priests acquired state power. Christian doctrine was transformed to enable them to stay permanently in power. From a philosophy of love, Christianity was changed to a doctrine of doomsday and sin— notions which Christian priests could use as weapons to terrify people and rule over them.

The philosophers of Alexandria criticised the changes in religious beliefs which they saw as motivated by the Christian priests' quest for power. Since the basis of church power was fragile, the priests were intolerant of this criticism, and retaliated violently. They physically attacked the philosophers, smashed their temples, and burnt all their books and libraries throughout the Roman empire. They smashed

even the temple of Serapis and burnt down the Great Library of Alexandria.

Since the philosophers valued learning as the means to virtue, Hypatia sought to spread virtue using mathematics—the science of learning or the science of the soul. The present form of the *Elements* dates back to this process, initiated by Theon and completed by Hypatia. She aimed to *demonstrate* mathematics as the science of learning, which aroused the soul, proving the existence of past lives, as Socrates had argued. She aimed to explain, like Porphyry, that images (geometric figures, idols) were good since they facilitated learning; that God was not a powerful entity “out there” but was within (immanent); that all people were equal, in essence, just because all were equally a part of one God. The book *Elements* was specially addressed to Christians, for its first proposition has the fish-figure, the secret sign that Christians made upon meeting each other. All this made the priests afraid that their lies would be exposed; they gathered a mob and lynched Hypatia.

Her successor Proclus carried forward her valiant efforts. He wrote a commentary which made *explicit* the mysterious significance of the *Elements*. He argued that since mathematical truths were eternal truths, the world itself must be eternal, contrary to the Christian belief in creation and apocalypse.

The priests responded by declaring philosophy itself heretical and shut down all schools of philosophy in the Roman empire in 529. This triggered off the Dark Age of Christendom.

The philosophers stuck to their beliefs, and moved on to neighbouring Persia, which was not theocratic. This was just a short while after the communist revolution of Mazdak. He had advocated not only equity but also common ownership of all property, and attained huge popularity before being violently exterminated. Accordingly, the philosophers' idea of equity found ready resonances, and the philosophers were well-received by the then king of Persia, Khusrau Anoshirvan.

Nevertheless, because they came from an enemy country, at war with Persia, they were relocated to Jundishapur, a camp for captured Romans. Here they founded a hospital instead of a temple, as an equally good way to demonstrate their principles. Khusrau too adopted the practice of seeking out knowledge from all over the world, especially knowledge of healing. The art of healing then was holistic, incorporating both soul and cosmos. Hence this brought to

Persia the *Pañcalantra* fables, and astronomy texts from India, which were translated into Pahlavi. This emphasis on knowledge as virtue ushered in the Golden Age of Iran.

The Persian empire declined after Khusrau II, and was conquered by Arabs—whom it had earlier ruled. However, as was the case with Alexander's barbarian invasion, military victory in one direction led to the flow of culture in the other direction. The Abbasid Caliphate at Baghdad relied on the Barmakids who continued the Persian methods of administration. Learned doctors (*hakim-s*) from Jundishapur found favour with Khalifas.

Subsequently, both Haroun al Rashid and al Mamun encouraged the philosophers. They too followed the tradition of importing knowledge from all over the world, culminating in the setting up of the Baghdad House of Wisdom (Bayt al Hikma). This championed the Islamic theology of reason (*aql-i-kalam*) and rejected the literalist tradition as mindless and imitative (*naqli*). The work of al Khwarizmi illustrates their mindset: though based on Indian arithmetic texts, it is not a direct translation of any specific Indian manuscript, but involves a creative reworking from several manuscripts. Thus, it is wrong to refer to these scholars as translators.

During this Islamic Golden Age, there was a great demand for books, and the Baghdad book bazaar did roaring business. The market encourages dishonesty, and this led to the proliferation of fakes. Manuscripts supposedly written by famous or ancient authors were passed off for a higher price. This particularly included books by Aristotle, a term which meant "ancient Greek sage". This is how some 400 or more books came to be ascribed to Aristotle.

Constantinople was then a tributary of Baghdad, and imitated it. Consequently, many books were translated there *from Arabic to Greek*—this included the Indian *Pañcalantra*. The earliest text of the *Elements*, from 888 CE, probably derived from such a translation since all books unrelated to Christianity had been earlier declared heretical and burnt in Christendom. Had the text somehow survived underground in Christendom, it would not have been openly copied by an ambitious and prudent bishop, Arethas, though he could have imported knowledge—a tradition later also followed by the Roman Catholic pope Sylvester who imported "Arabic" numerals from Cordoba.

With the rise of the Umayyad Caliphate at Cordoba, the wealth and wisdom of the "Moors" came closer home to Western Christendom.

The Christian priests now started eyeing Moorish wealth. They tried to acquire knowledge from Islamic sources, in various ways, and even sent a high-level delegation to Cordoba. During this time, Western Christianity had spread across Europe, by means of forcible conversions through the conquests of Charlemagne, instigated by the pope. With the elimination of its hate object—the pagans—the Christian church had become moribund, and the priests were in search of a new hate object and new conquests.

An opportunity arose with the decline of the Cordoba Caliphate in the 11th c. and its breakup into small *taifas*. An exploratory prototype Crusade had already been launched around 1060 against these wealthy but militarily weak *taifas*. The fall of Toledo was part of these Crusades even though that happened a few years before the official declaration of the first Crusade. Indeed, even to this day it is projected (somewhat hilariously) as “reconquest”, which puts it in the same category of religious warfare as the Crusades. Also the religious-war tactic of using an internal disaffected Christian population was used at Toledo just as it was used later at Jerusalem during the first Crusade. (This stock tactic was also explicitly advocated with respect to Indian [Syrian] Christians, and used by Vasco da Gama in his eventual alliance with them.)

In any case, the fall of Toledo brought its large library under Christian control. This presented both an opportunity and a problem. The opportunity was to grab the knowledge in those Arabic books, which knowledge could earlier be obtained only with great difficulty through delegations, spies and such like. The problem was that the sources of this knowledge were heretical. Delving into them was contrary to the centuries-old Christian practice of burning non-Christian books. Changing that book-burning Christian tradition was particularly difficult in the then-prevailing atmosphere of religious hysteria against Islam.

Eventually, after four decades, a simple solution was found: a fake ancestry was invented for this knowledge. It was given out that the knowledge in these books was all of early-Greek origin. The Arabs were portrayed as mere carriers of this knowledge, as were later-day “Greeks”, such as Theon or Hypatia, who opposed the church. The silliest imaginable artifices were used to concoct these early Greeks for the benefit of the overheated religious imagination: for example, the Arabic “uclides”, meaning “key to geometry”, was probably translated as the name of a Greek “Euclid” who authored

the text called the *Elements*. This myth was then propagated for five centuries by identifying this fictitious "Euclid" with Euclid of Megara, a contemporary of Plato, who was innocent of any knowledge of geometry.

The laughable myth persists to this day that all world-knowledge was due to the theologically correct early Greeks. In addition to claiming a theologically correct *origin* for all world knowledge, the knowledge itself had to be made theologically correct. This was done in two steps. First, the Christian doctrine was again altered to suit the priests' lust for power. Second, the incoming knowledge was reinterpreted to fit the changed Christian doctrine.

The priests who launched the Crusades initially aimed to conquer and convert Muslims violently, just the way pagans in Europe had been conquered and converted. However, after the first Crusade and beyond Spain, this tactic of propagating Christianity by military force failed because all the multi-nation forces of Christendom, put together, were militarily too weak then to conquer Muslims.

Accordingly, the only way left to convert Muslims was by persuasion, and the change in Christianity was designed to facilitate that. Since Muslims accepted only reason and not the Christian scriptures, the only way to persuade them was to use reason. Before that, however, reason had to be made part of Christianity. Accordingly, Christianity was changed into a doctrine of reason. This was done by "borrowing" the prevailing Islamic rational theology and "adjusting" it suitably. The resulting Christian rational theology of Aquinas and his schoolmen (post-Crusade theology) modified Islamic rational theology to make it compatible with the first (post-Nicene) alteration of Christianity.

Obviously, the post-Crusade idea of Christianity as a doctrine of reason did not fit any of the earlier ideas of Christianity as a doctrine of love, or a doctrine of doomsday and sin. A new gospel and a new messiah were required for this change.

When Christianity was first altered, in the 4th c., by changing reincarnation to resurrection, in order to bring in sin, doomsday, and eternal punishment, this had precipitated a religious war. Philosophers then had used mathematics to defend their notion of soul and to persuade Christians to stick to original Christianity. The *Elements* was written for that purpose. Reason was seen as a means to reach the soul within.

However, Christian priests now wanted to convert and dominate Muslims by argument. Accordingly, reason was disconnected from the soul, and reinterpreted as just a "universal" means of convincing argument. Mathematics too was disconnected from "pagan" religious beliefs about the soul, and reinterpreted as just a doctrine of reason, meaning a way to teach methods of argument to priests. Attributing the *Elements* to an unknown early Greek called "Euclid" facilitated this reinterpretation.

The belief that mathematics is just about convincing arguments or proof is thus a specifically Christian belief deriving from Crusading times, and linked to the priests' agenda of world-power. When combined with the Christian belief in their own superiority, this led historians (even "enlightened" historians like Needham) to run down the idea of mathematics as calculation found in all other cultures.²²⁹

After 350 years of bloody religious warfare, the Crusades effectively came to an end with the fall of Istanbul (Constantinople) to Mohammed the Conqueror in 1452. Constantinople, which had been the centre of Eastern Christianity for the preceding 11 centuries, had a large stock of books written in Byzantine Greek. Since Islam prohibits book burning, most of these books were sold off where there was a demand for them—in Europe. Thus, a flood of (Byzantine) Greek books from Constantinople arrived in Europe in the 15th c.

This was used to boost the Hellenization of history. No thought was given to the possibility that these later-day Byzantine Greek texts involved systematic translations from Arabic to Greek, such as the Arabic-to-Greek translation of the *Pañcalantra* or the Syriac-to-Greek translations of Ibn Shatir used by Copernicus. Instead, all of these texts were portrayed with religious fervour as "original Greek" sources. Although the Greek texts of the *Elements* did not mention any Euclid, the Latin translations of these Greek texts stated that the text was authored by "Euclid of Megara".

A further fillip was given to this Hellenization of history by later-day racist historians, who portrayed all world knowledge, before Christianity, as the work of the "Greek" race. The learned Egyptians, from whom the Greeks learnt, were erased because they were blacks.

By way of "evidence", these racist historians produced stray remarks from mounds of Byzantine Greek manuscripts, which already incorporated a variety of myths. For example, the key evidence for "Euclid" still is just an isolated passage in a late text attributed to Proclus. This forged passage fixes the date of "Euclid" by a reference

to Euclid in another stray remark in another late text fancifully attributed to Archimedes and so on. Needless to say, the slightest critical examination shows up these textual remarks as interpolations or forgeries that have nil value as evidence. Nevertheless, this religious-racist myth of the Greek origin of knowledge continues to be propagated by planting racist images of Caucasian stereotypes of these Greeks on the Internet and in present-day school texts.

What difference does it make whether or not this “Euclid” existed? Now, those who think it does not matter should not object to removing “Euclid” from school texts and casting this toxic myth into the garbage bin where it belongs. Instead of mentioning “Euclid”, these school texts should state that people mindlessly believed false history about “Euclid” for centuries.

“Euclid” is not an isolated lie; it is just the proverbial tip of the iceberg, the top of a whole dung heap of lies about history which the church told to justify that Christians were superior. The belief in racial superiority originated from the belief in Christian superiority. The very same false history was later used by Western “philosophers” like Kant and Hume to justify racism and to claim that white-skinned people were superior—the political power from that claim persisted until very recently in South Africa. Those who claim “Euclid” no longer matters should allow (in school texts) that “Euclid” was actually a black woman from Africa raped on a church altar and then lynched by a mob closely related to the one which burnt down the library of Alexandria.

What blacks, browns, “yellows”, “reds”, Muslims and Hindus need to understand is this: the false history of “Euclid” is part of a systematic technique of building power through lies which attack your self-esteem. Self-esteem is an intangible, but, like time in the game of chess, this intangible can be more important than material resources. This technique of attacking self-esteem was persistently used by a vast institution—the church—which is at the very core of Western civilization which it has dominated for centuries with its lies.

A key aim of this book is to expose this technique of building political power through lies which are then propagated through the education system, and maintained by a vast organized network of scholars, paid for that purpose. This book would have accomplished its purpose if people understand this technique of propaganda, and learn that it is dangerous to trust the West in any matter, without independent confirmation—independent also of Western-approved

stooges who act as indigenous "experts"! Distrust and scepticism of the West is needed to break out from mind control through indoctrination instilled by the present-day education system designed by the church. Scepticism and distrust of the West is the key first step towards true emancipation.

Now, church violence was not confined to genocide and slavery, or to the invasion and capture of colonised minds. This violence traditionally extended to women, as in the numerous hapless women who were declared witches and burnt at the stake to establish church morality. But Hypatia is special. The church murdered Hypatia twice. The first time physically, and the second time by erasing her from history. Hypatia is also special because if the authorship of the *Elements* is allowed to Hypatia, then the *Elements* must be regarded as a "pagan" religious text, *contrary* to altered Christianity, the way Proclus interpreted it.

Attributing the *Elements* to an unknown early Greek called "Euclid", however, allowed the text to be reinterpreted in conformity with post-Crusade Christian theology. This reinterpretation negated all the points about mathematics dear to the philosophers, and projected the text as a universal means of persuasion, to fit the requirement of the priest. Eliminating "Euclid" changes the standard of secular and universal truth today, so it can no longer be determined in conformity with Christian metaphysics: for it was through this artifice of "Euclid" that "universal" reason has been made into a handmaiden of the church.

I hope this book has indicated how this handmaiden continues to be used today in the propaganda against Muslims through science. Those interested in further details should follow my more scholarly writings. However, the situation has changed since the Crusades. Then the Muslims were militarily dominant. Today, Muslim countries are so weak that they are being repeatedly invaded and their leaders killed, and puppet leaders installed. Worse, their persons have been invaded and their minds captured, creating a conflict within or a schism in the soul. Thus, they may call themselves Muslims, but they adhere to Christian metaphysics, and decide the validity of scientific theories by submitting them for Western certificates of approval. Indeed, that is today the government policy in Islamic countries, and one to which Muslim intellectuals in those countries are subjected. It is in the interests of Muslims to change those policies, for it is possible to reformulate both mathematics and science to free them from the

influences of Christian metaphysics. Indeed, that has already been done, and hopefully this book will make more people aware of that.

Of course, Christians too should be aware that this "Christian" metaphysics differs fundamentally from early Christianity, as much as a doctrine of genocide differs from a doctrine of love. As this book has explained, original Christianity was repeatedly altered to suit the political and material interests of the church. So, the only grounds for this "Christian metaphysics" are that it contributes to the power of the church and its power-hungry priests. It is for Christians to decide whether they want to remain mentally enslaved to a church which has done such great damage to the original doctrine of universal love. They must understand that if they do, they would be partners in hate crimes against humanity.

For seven centuries, authorship of the *Elements* was attributed to "Euclid" to claim that the *Elements* was a model of clarity, and that all others (Egyptians, Indians, Chinese, etc.) did not understand the right way to do mathematics. Eventually, in the 20th c. the West came to the curious conclusion that even "Euclid" did not understand the right way to do mathematics, and had blundered in his very first theorem, and in a key theorem known as the Side-Angle-Side theorem. These theorems used empirical proofs. But instead of dismissing the myth of the metaphysical proofs in the *Elements*, Western mathematicians like Russell dismissed those empirical proofs in the *Elements* as a "tissue of nonsense" because they did not live up to the Western myth built around the *Elements*! This is the hilarious basis of the current philosophy of formal mathematics, elaborated by Hilbert and Russell in the 20th c. This started being taught to children as the "new math" from the 1960s in the US.

Although not overtly motivated by any religious concerns, the religious biases in this formalist philosophy are apparent, and have been repeatedly pointed out over the last decade. Empirical proofs are universal, *not* metaphysical proofs; eliminating empirical proofs is contrary to *all* systems of Indian philosophy. Thus elevating metaphysical proofs above empirical proofs, as formal mathematics does, is a demand to reject all Indian philosophy as inferior. Curiously, like Indian philosophy, present-day science too uses empirical means of proof, so this is also a demand to reject science as inferior (to Christian metaphysics).

Logic is *not* universal either as Western philosophers have foolishly maintained: Buddhist and Jain logics are different from those

currently used in formal mathematical proof. The theorems of mathematics would change if those logics were used. So, imposing a particular logic is a means of cultural hegemony. If logic is decided empirically, that would, of course, kill the philosophy of metaphysical proof. Further, it may result in quantum logic, similar to Buddhist logic.²³⁰

This religious bias in present-day formal math extends also to the anti-Islamic *postulates* with which calculus is taught, as I have explained elsewhere. This business of metaphysical proof adds nothing to the practical applications of mathematics to science, for science, of course, accepts empirical proofs. So, it is quite possible to regard mathematics as an auxiliary physical theory.

But the drop of metaphysics does add to the difficulty of math, as Russell gleefully observed. The simple way out is to eliminate it. I hope this book has given some idea of how physical proofs can greatly simplify mathematics. Don't expect the formal mathematicians in the system to support this proposition, for they would lose their jobs in the process. But watch out for my next book on how to teach calculus the easy way.

Colonial education globalised the church system of education. Many people today are concerned with the way that education system continues to indoctrinate people today. These people need to rise up and protest against this imposition. They need to point out that implanting religious biases through education is unconstitutional in many countries, and unethical everywhere. This book has hopefully helped them to understand those subtle biases in mathematics.

As for those young people who are victims of these biases, get rid of those biases even if they are forced on you by your parents. A simple way to do so is to ask questions. If the answers sound like story-telling, used to preserve lies, you know what trick is at work. Remember, they can't capture your mind without your consent. Don't give that consent: keep asking questions, and see how those stories fall apart.

After the Crusades, philosophy has been almost wholly taken over by priests, so priests and philosophers are friends once again. So, is that the end of the story? Did the priests ultimately win the epic struggle between priests and philosophers? No, for the battle goes on. . . . The new history has opened many future lines of development indicated above. This book has explained how mathematics and the *Elements* were reinterpreted, and how that has made mathematics—the science of learning—into such a difficult subject to learn today. Just

as I am seeking to remedy those changes, others will seek to explore and remedy the parallel changes in Christian doctrine, and the Bible, which changed a mystery narrative of love into such a doctrine of hate and perpetual violence. The work of one Isaac Newton—who devoted a lifetime to document the alterations of the Bible—could be suppressed, but others will work at it. And the truth will surely emerge some day, not too far off.

The story is far from over, but remember that you will be one of the authors who completes it.

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Despite the best attempts of my well-wishers, if errors persist, it is obviously because of my own stubbornness!

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9. Edward Gibbon, *The Decline and Fall of the Roman Empire*, vol. 1, Great Books of the Western World, vol. 37, Encyclopaedia Britannica, Chicago, 1996, p. 460. Emphasis original.
10. Herodotus, *History, Euterpe*, 50–58, trans. G. Rawlinson, Encyclopaedia Britannica, Chicago, 1996, p. 60.

11. Herodotus, *History*, cited above, p. 58. Herodotus, of course, distinguishes between Hercules the hero (i.e., progeny of a god), and Hercules the god, and mentions approvingly how some Greeks maintain two separate temples, one for the hero and one for the god.
12. This explanation is in a book *On Images* banned and burned by Christians, fragments of which survive today. The quotation is from Fragment 10, which is available online at <http://classics.mit.edu/Porphyry/images.html>.
13. These included Caligula (reigned 37–47 CE), who built a temple of Isis, Vespasian (r. 69–79 CE) who became a devotee of Serapis, and demonstrated a miraculous healing of a blind man, Trajan (r. 98–117 CE) who is depicted on his triumphal arch as sacrificing to Isis, and Carcella (r. 198–211 CE) who is depicted on his coins as "Sarapis Cosmocrator", and called himself "Philosarapis". Jocelyn Goodwin, *Mystery Religions in the Ancient World*, Harper and Row, 1981, pp. 57–63.
14. More details in Timothy Freke and Peter Gandy, *The Jesus Mysteries: Was the "Original Jesus" a Pagan God?*, Three Rivers Press, New York, 1999.
15. The other part of the name Serapis, namely the bull Apis, also related to fertility. Porphyry relates Apis to the "ox called Mnevis... in Heliopolis... very black... because much sunshine blackens men's bodies... Its testicles are very large, since desire is produced by heat, and the sun is said to fertilize nature". Porphyry, *On Images*, cited above.
16. Gibbon, cited above, p. 462.
17. According to the *Augustan History*, http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Historia_Augusta/Firmus_et_al*.html/#8, the letter is attributed to the Roman emperor Hadrian, though this seems very doubtful, and the letter seems to be from at least a couple of centuries later.
18. Justin Martyr, *First Apology*, chp. 21, "Analogies to the History of Christ", <http://www.earlychristianwritings.com/text/justinmartyr-firstapology.html>. (From A. Roberts & J. Donaldson, ed. "Justin Martyr", *Ante-Nicene Fathers*, vol. 1, T&T Clark, Edinburgh, 1980.)
19. Justin Martyr, *Dialogue with Trypho*, chp. 69, "The Devil, since he Emulates the Truth, has Invented Fables about Bacchus..." (ed. Roberts & Donaldson), <http://earlychristianwritings.com/text/justinmartyr-dialoguetrypho.html>. Prior to the advent of Christianity, Cicero wrote, "When we call corn Ceres, and wine Bacchus, we make use of the common manner of speaking; but do you think any one so mad as to believe that his food is a Deity?" Cicero, *On the Nature of the Gods*, 3.16, trans. C. D. Yonge, New York, Harper and Brothers, 1877. <http://thriceholynet/Texts/Cicero3.html>. Today, during the Eucharist ritual, Christians believe the bread symbolizes the flesh of Christ, and the wine his blood.
20. Tertullian, *Apologetic*, chp. XLVII, *Ante-Nicene Fathers*, vol. 3 (ed. A. Menzies, T&T Clark, Edinburgh), <http://www.ccel.org/ccel/schaff/anf03.iv.iii.xlvii.html>. Tertullian needed no evidence for thinking that Christian beliefs were earlier; his reason was simply his faith that his religion was real, and the others were shadows: "If they maintain their sacred mysteries to have sprung from their own minds, in that case ours will be reflections of what are later than themselves, which by the nature of things is impossible, for never does the shadow precede the body which casts it, or the image the reality."
21. Gibbon, *Decline and Fall*, p. 461.
22. <http://www.newadvent.org/cathen/14625b.htm>.

23. The historian Gibbon points out that claims that the Roman empire earlier persecuted Christians are false and are refuted even by impeccable earlier Christian sources like Origen: "The learned Origen... declares, in the most express terms... that the number of martyrs was very inconsiderable... His authority alone would be sufficient to annihilate that formidable army of martyrs, whose relics, drawn for the most part from the catacombs of Rome, have replenished so many churches, and whose marvellous achievements have been the subject of so many volumes of holy romance... Dionysius... in the immense city of Alexandria, and under the rigorous persecution of Decius, reckons only ten men and seven women who suffered for the profession of the Christian name." Gibbon goes on to explain the origins of the wildly exaggerated stories of Christian martyrs as follows: "The total disregard of truth and probability in the representation of these primitive martyrdoms is occasioned by a very natural mistake. The ecclesiastical writers of the fourth or fifth centuries ascribed to the magistrates of Rome the same degree of implacable and unrelenting zeal which filled their own breasts against the heretics or the idolaters of their own time." (E. Gibbon, *Decline and Fall of the Roman Empire*, vol. 1, Encyclopaedia Britannica, Chicago, 1996, chp. 16, p. 217.) The church has made personal attacks on Gibbon, trying to brand him "anti-Christian", and in my opinion this is a dead giveaway of its complete inability to refute Gibbon's arguments or the evidence he marshalled. Even as regards the ten "martyrs", we need to impartially understand the source of tension: claiming to be against idolatry, the Christian hardliners desecrated pagan shrines and temples. What would be the response today if some Islamic sect started desecrating the images of Jesus Christ, commonly found in churches, on the grounds that they were against idolatry? The picture of a grand war between Christianity and the Roman state is refuted by non-Christian sources like the Jewish historian Josephus who seems unaware even of the existence of Christianity at the end of the first c. CE. Likewise, the younger Pliny, a very learned Roman of the 2nd c. CE, had to write to ask about the Christians. How could the Romans have persecuted a group of people whose very existence they were unaware of?
24. Though this part is narrative, and needs no documentation, some people will recognize that these are Theophilus' own words, taken from the document called *The Vision of Theophilus*. The next quote on the vision of the three thetas is also from the same document.
25. Gibbon, *Decline and Fall*, p. 462.
26. Gibbon, *Decline and Fall*, p. 62.
27. The destruction of temples was a systematic policy of the church. Over a thousand years later, almost immediately after the Portuguese were established in Goa (with plenty of inside help) by 1520, Bishop Dume wrote to the king of Portugal, on 12 January 1522, advising that the temples in Goa island be demolished, and churches erected on their sites. This meant rendering service unto God. Those who wanted to live on the island had to convert to Christianity, and those who refused had to leave. By 28 June 1541, all Hindu temples in Goa island were demolished; this task was carried out by Miguel Vaz, who was blessed for it by Francis Xavier, later declared a saint. P. S. S. Pissurlencar, "Govyache Khristikarana" [The Christianization of Goa], *Shri Santadurga Quatercentenary Celebration Volume*, Shaka 1488-1818, published by Durgarao Krishna Borkar, Bombay, 1966, pp. 91-122. English translation, *Dr Pissurlencar Collection*, part I, Goa University Publication Series, No. 3, pp. 67-69.

28. Quoted from article on "Sarapis" in the Encyclopaedia Britannica CD 2005. Note the difference in spelling.
29. International Conference on *Knowledge and East-West Transitions*, National Institute of Advanced Studies, Indian Institute of Science Campus, Bangalore, Dec 2000.
30. C. K. Raju, "How should 'Euclidean' geometry be taught?", paper presented at the International Workshop on *History of Science, Implications for Science Education*, Homi Bhabha Centre, TIFR, Bombay, Feb 1999. In *History and Philosophy of Science: Implications for Science Education*, ed. Nagarjuna G., Homi Bhabha Centre, Bombay, 2001, pp. 241–260.
31. Thomas Heath, *A History of Greek Mathematics*, Dover, New York, 1981, p. 360.
32. Heath, *Greek Mathematics*, cited above, p. 357.
33. Martin Bernal, *Black Athena: The Fabrication of Ancient Greece 1785-1985*, Vintage, 1991, and the earlier book by George G. W. James, *Stolen Legacy: Greek Philosophy is Stolen Egyptian Philosophy*, reprint, Africa World Press, 1994.
34. 22 Dec 2000. For good measure, the reporter went on to falsely attribute some wild claims to me. A formal complaint of misrepresentation made to the newspaper fetched no response, so clearly the reporter had no interest in the truth but only in the story.
35. C. K. Raju, *The Eleven Pictures of Time*, Sage, New Delhi, 2003, appendix.
36. <http://mathforum.org/kb/message.jspa?messageID=1175733&tstart=0>, Historia Matematica discussion list, 9 Nov 2002.
37. <http://mathforum.org/kb/thread.jspa?threadID=381990&messageID=1175734%#1175734>, Historia Matematica discussion list, 10 Nov 2002.
38. <http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Euclid.html>.
39. <http://aleph0.clarku.edu/~djoyce/java/clements/elements.html>.
40. <http://freedom-in-education.co.uk/Euclid/euclid.htm>.
41. <http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Euclid.html>. Continued from earlier quote.
42. W. W. Rouse Ball, *A Short Account of the History of Mathematics*, Dover, New York, 1960, pp. 1–2, emphasis mine.
43. This is a general rule with what are called "barbarian incursions" by Toynbee. As another example, Hulegu's conquest of Baghdad led to the flow of Islam to the Moghuls. Clearly, Macedonians and the (non-Ionian) Greeks were then on the fringes of the civilized world, so Alexander's invasion must be counted as a "barbarian invasion" regardless of the glorification of Alexander by the West. For further details on this thesis that "barbarian invasions" in one direction lead to a flow of knowledge in the other direction, see C. K. Raju, "Models of information transmission", chp. 6 in *Cultural Foundations of Mathematics*, Pearson Longman, 2007.
44. *Mathematics: Textbook for Class IX* (J. V. Narlikar, P. Sinclair, et al.), NCERT, New Delhi, 2005, p. 80. The photographs in the text include those of Pythagoras, p. 5, Archimedes, p. 13, Thales, p. 79, and Heron, p. 199. After I raised the issue of racial stereotyping, the latest edition of this text has changed the image of "Euclid" to make him look Chinese!
45. In other words, *this* "Dark Age" was confined to Christendom, and was not some sort of universal "Dark Age" found in various myths. So, one should speak of a *Christian* Dark Age. Likewise, it is incorrect to speak of a "European" renaissance, since this Arab knowledge was already very much present in Europe, in Spain, during the Christian Dark Age. So, we should more properly speak of a *Christian* renaissance.
46. Heath, p. 1, note 4.

47. Proclus, *A Commentary on the First Book of Euclid's Elements*, trans. Glenn R. Morrow, Princeton University Press, Princeton, New Jersey, 1970, Prologue part 2, p. 52. This agrees with the story told by the Greek historian Herodotus. Herodotus, *History, Euterpe*, 109, trans. G. Rawlinson, Encyclopaedia Britannica, Chicago, 1990, p. 70.
48. Proclus, *Commentary*, p. 56.
49. G. Friedlein, *Procli Diadochi in primum Euclidis Elementorum commentarii*, B. G. Teubner, Leipzig, 1873.
50. D. Hunter, *Papermaking: the History and Technique of an Ancient Craft*, Pleiades Books, London, 1947.
51. *On the Sphere and the Cylinder I*, Proposition 6, in *The Works of Archimedes*, trans. T. L. Heath, *Great Books of the Western World*, vol. 10, Encyclopaedia Britannica, Chicago, 1996, p. 407.
52. J. Hjelmslev, "Über Archimedes' Grössenlehre", *Danske Vid. Selsk. Mat.-Fys. Medd.* 25(15) 1950.
53. Though block printing technology had long been known in China, and iron printing presses had been made in Korea from at least the 13th c. CE, printing technology became known in Europe only in the 15th c. CE—one of the earliest presses being that of an unknown Gutenberg in 1452—and obviously came only after paper had become common. For printing technology in Korea, see Sang-un Cheon, *A History of Science in Korea*, Jimoondang, 1998.
54. The material on these papyri is edited and reproduced in E. S. Stamatis, *Euclidis Elementa*, vol. I, Leipzig, 1969, pp. 187–190.
55. David Fowler, *The Mathematics of Plato's Academy*, Clarendon Press, Oxford, 1999, 2nd ed., p. 216.
56. Since "Aristotle" of Toledo. See my article on "Logic" in *Encyclopedia of Non-Western Science, Technology and Medicine*, Springer, 2008. Available online at <http://ckraju.net/papers/Nonwestern-logic.pdf>.
57. e.g., Heath, p. 16.
58. Proclus, *Commentary*, p. 29.
59. "From this practice, I think, geometry first came to be known in Egypt, whence it passed into Greece." Herodotus, *History*, Book II, 109, p. 70.
60. C. K. Raju, "India's interaction with China, Central Asia, and West Asia in the Field of Mathematics and Astronomy", in A. Rahman ed., *India's Interaction with China, Central Asia and West Asia*, Oxford University Press, New Delhi, 2002.
61. Proclus, *Commentary*, p. 38.
62. Plato, *Meno*, in *Dialogues of Plato*, cited above, pp. 179–180.
63. *Meno*, cited above, p. 180.
64. *Meno*, p. 182.
65. Plato, *Republic* III.401, p. 433.
66. Plato, *Republic* VII.526, p. 394.
67. Plato, *Republic* VII.527, p. 394.
68. Plato, *Apology*, 26, p. 204.
69. *Aristotle: I*, Encyclopaedia Britannica, Chicago, 1996 (*Great Books of the Western World*, vol. 7), p. vi.
70. Alexander had probably chosen the city as a base from which to launch an attack on India by sea after his troops mutinied at the frontier of India, frightened by the might of Magadha, and shocked by the stiff resistance they encountered from a minor frontier chief, after their easy and virtually bloodless victories over Egypt, Babylon, and then Persia. To secure the sea-route to India, Alexander planned

- also to capture Oman, but shortly before he could launch such an attack, he died mysteriously, poisoned, some say, by one of his generals.
71. The source of this figure is the 12th c. Byzantine scholar John Tzetzes who mentions 400,000 books plus an additional 90,000 books and another 42,000 books in the Serapeum, in his *Prolegomena to Aristophanes* (one of the librarians of the Great Library). See, e.g., Edwyn Bevan, *The House of Ptolemy*, Argonaut Inc., Chicago, 1968, p. 25.
 72. Ammianus Marcellinus, *Roman History*, 22.16.15. The same figure is mentioned in the 2nd c. Aulus Gellius, *Attic Nights*, 7.17. A listing of various sources, from a generally unsympathetic point of view, may be found at http://www.bede.org.uk/Library2.htm/#_ednref10.
 73. Perhaps the only king in history who can be called "Great", not because of his vast empire, but because he sorrowed after a victory, and renounced violence.
 74. This is recorded in the thirteenth rock edict, which also records Ashoka's sorrow after his victory in Kalinga. The Greek version of this rock edict, found in Kandahar (Afghanistan), translates "Dhamma" as *eusebia* or piety.
 75. Academicians commonly classify these philosophers as Hermetic, Neo-Platonist, Gnostics (within Christianity), sufi (in Islam) etc. Those classifications are not relevant to this book.
 76. Porphyry, *On Images*, trans. E. H. Gifford, Internet Classics Archive, <http://classics.mit.edu/Porphyry/images.html>.
 77. This explanation is from Abammon the teacher who replies to questions raised by Porphyry, as recorded in Iamblichus, *Theurgia or the Egyptian Mysteries*, trans. A. Wilder; Rider, London. Available online at http://www.esotericarchives.com/oracle/iambli_th.htm, chapter 15.
 78. Iamblichus, *Egyptian Mysteries*, cited above, chapter 4, "Rites, Symbols, and Offerings".
 79. Likewise, cannabis (*bhāṅg*) is used as an aphrodisiac in the festival of Holi, which marks the start of the New Year on the Indian calendar. Holi is traditionally celebrated in a way very similar to festivals devoted to Bacchus. The sprinkling of colours, for example, makes one person indistinguishable from another, i.e., it makes all people equal.
 80. Iamblichus, *ibid*.
 81. i.e., its existence is both logically and empirically refutable in a Popperian sense.
 82. *The Bhagvad-Gita*, trans. Swami Prabhavananda and Christopher Isherwood, Marcel Rodd, Hollywood, 1945.
 83. E. A. Wallis Budge, *The Egyptian Book of the Dead*, Kegan Paul, London, 1901, p. 278. A possible explanation of how the cosmos might grow younger each "day" would take too long.
 84. This figure mentioned briefly in the Bhagvad-Gita is explained through an elaborate calculation in *The Vishnu Purana*, trans. H. H. Wilson, London, 1840, reprint, with an introduction by R. C. Hazra, Punthi Pustaka, Calcutta, 1961, chp. 3, pp. 19–24. The figure is obtained through equations of the type "1 year of mortals = 1 day of the gods". Astronomers in the Indian tradition justified this equation by appealing to the picture of a spherical earth, "surrounded on all sides by creatures just as the bulb of the kadamba flower is by blossoms". They regarded day and night as due to rotation relative to the cosmic sphere, on a north-south axis, so that day and night at the poles are six months each. The gods were supposed to stay on Mount Meru, located at the north pole, so that one day and night of the gods quite literally amounted to one year of humans! "The gods see the Sun, after it has risen, for half a solar year." Āryabhaṭa, *Āryabhaṭīya*

- (Gola 6-7, 17), trans. K. S. Shukla and K. V. Sarma, Indian National Science Academy, New Delhi, 1976, pp. 118, 127.
85. According to the Poincaré recurrence theorem. For a less technical account see C. K. Raju, "Ātman, quasi recurrence, and *paticca samuppāda*", *Self, Science and Society, Theoretical and Historical Perspectives*, ed. D. P. Chattopadhyaya and A. K. Sengupta, PHISPC, New Delhi, 2005, pp. 196–206.
 86. For a proof of a general form of the Poincaré recurrence theorem, applicable to the case of geodesic flows, and to other deterministic generalisations of Newtonian physics, see, C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994, appendix to chp. 4, "Thermodynamic Time". Even deterministic evolution is not needed, and recurrence also applies to stochastic evolution which is history-independent or Markovian. Physics texts commonly state that the recurrence time is very large, but such statements have no serious basis, and are *conceptually faulty*, as pointed out in the chapter cited above, so that this is a very naive way to resolve the "recurrence paradox" of thermodynamics.
 87. Martin Bernal, *Black Athena*, Free Association Books, London, 1987, pp. 124–128.
 88. This date also fits well with the textual evidence, namely that the Roman historian Josephus, writing at the end of the 1st c. CE, does *not* mention Christians. The "Testimonium Flavium", a clearly forged passage, not only underlines this belief, it further shows how routinely priests tried to distort history by introducing forged passages into texts. This date of 2nd c. CE for the beginning of Christianity also fits in well with Pliny's queries about the Christians.
 89. For a description of this confusion from Newton and Nietzsche to T. S. Eliot and Stephen Hawking, see C. K. Raju, *The Eleven Pictures of Time: the Physics, Philosophy, and Politics of Time Beliefs*, Sage, 2003, and especially, chp. 2, "The Curse on 'Cyclic' Time".
 90. Origen, *De Principiis*, Book II, chp. 1, paragraph 1 (<http://www.newadvent.org/fathers/04122.htm>), "the world... is composed not only of rational and diviner natures,... but of dumb animals, wild and tame beasts, of birds, and of all things which live in the waters; then,... of places, i.e., of the heaven or heavens, and of the earth or water, as well as of the air, which is intermediate, and which they term aether."
 91. Origen, *De Principiis*, II.3.1, cited above.
 92. Origen, *De Principiis*, II.3.5, cited above.
 93. Origen, *De Principiis*, II.3.5, cited above.
 94. Origen, *De Principiis*, II.3.4, cited above.
 95. *ibid.*, II.3.4.
 96. *ibid.*, II.3.4.
 97. *ibid.*, II.9.6.
 98. Origen, *De Principiis*, Book II, chap. 9. Frederick Crombie, trans., *The Writings of Origen*, vol. X in Ante Nicene Christian Library, ed. Alexander Roberts and James Donaldson, T&T Clark, Edinburgh, 1895, p. 136.
 99. E.g. A. H. M. Jones, *Constantine and the Conversion of Europe*, English Universities Press, London, 1948.
 100. There has been so much hagiography about what transpired at Nicea that later Christian sources should be almost wholly discounted as unreliable. The earliest hagiographer, Eusebius, in his *History of the Church*, does not mention any theological conflict concerning Arius at Nicea, but refers only to the date of Easter.

101. Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton* [1980], Cambridge University Press, paperback edition, 1983, p. 350; original in Yahuda MS, 9.2, ff. 99–99v.
102. Obviously we cannot trust doctored Christian textual sources such as Eusebius on this point, for the non-textual evidence of coins that Constantine minted clearly contradicts them. It was perfectly possible for Constantine to issue religiously neutral coins, if he wanted, but he did not do so, and instead proclaimed his belief in the sun etc., and this clearly gives the lie to the church historians.
103. Those hardliners constitute the current orthodoxy!
104. Dante Alighieri, *Divine Comedy: Inferno*, Canto XXVII, trans. Charles S. Singleton, Encyclopaedia Britannica, Chicago, 1996, p. 35.
105. See C. K. Raju, "The curse on 'cyclic' time", chapter 2 in *The Eleven Pictures of Time*, Sage, 2003.
106. In a word, Augustine replaced Origen's notion of quasi-cyclic time with the notion of apocalyptic time. C. K. Raju, *ibid*.
107. J. Head and S. L. Cranston, *Reincarnation in World Thought*, Julian Press, New York, 1967.
108. "in created things there may appear to be nothing unrighteous or accidental, but that all things may be shown to be in conformity with the law of equity and righteousness", Origen, *De Principiis*, cited earlier, II.9.4.
109. Paulos Mar Gregorios, personal communication.
110. Westfall, *Never at Rest*, cited above, p. 313; original in Yahuda MS, 14, f. 57v; Keynes MS, 2, pp. 19–20.
111. Westfall, *Never at Rest*, pp. 323–24; original in Yahuda MS, 14, ff. 67–68.
112. C. K. Raju, "Newton's Secret", in *The Eleven Pictures of Time: The Physics, Philosophy, and Politics of Time Beliefs*, Sage, New Delhi, 2003, chp. 4.
113. The pejorative word "pagan" meaning "rustic", or "civilian" already gives away city-based soldiers as the key constituency of the early imperial church—people on whom the Roman state also depended.
114. Clarence A. Forbes, "Books for the Burning", *Transactions of the American Philological Society* 67, 1936, pp. 114–25.
115. R. J. Hoffman, *Porphyry's Against the Christians: The Literary Remains*, Oxford University Press, 1994, p. 50.
116. In a situation where most people were illiterate, the reliance on forged documents was a fairly common matter. For example, the land and special status of the Vatican (as a state within a state) was obtained by means of one such forged document, called the Award of Constantine. The "Award of Constantine", or the "Donation of Constantine" (*Donatio Constantini*) was a document, allegedly under the signature of emperor Constantine, which granted the Vatican to the church, along with its special status as a state within a state. The document which the church at first claimed to have discovered (in the 8th c.) was later (in the 15th c.) shown to be a forgery. But this realisation did not change the status of the Vatican. See, e.g., E. F. Henderson, *Select Historical Documents of the Middle Ages*, George Bell, London, 1910, pp. 319–29, or *The Penguin Atlas of World History*, vol. 1, Penguin Books, New York, 1974, pp. 140, 212. It does not take much imagination to see who would have wanted to forge such a document! By the time the document was exposed as a forgery, it was too late to change anything. This shows how telling lies can lead to an advantage which persists even after the lie is exposed.
117. Gibbon, cited earlier, p. 462.
118. Gibbon, vol. 2, note 121 to chp. 51, p. 681.

119. Gibbon, vol. 2, chp. 51, p. 274.
120. Gibbon, cited earlier, footnote 41 to chapter 28, p. 818.
121. For a detailed account, see C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003. Briefly, Origen believed in quasi-cyclic time, but Augustine misrepresented it as a belief in super-cyclic time, by clubbing both types into a single category of "cyclic" time. This confusion about "eternal return" so permeates Western thought, even among the most learned Western scholars today, that it is hard to find a Westerner today who can overcome it.
122. Plato, *Republic*, Book VII, 527. "... geometry will draw the soul towards truth, and create the spirit of philosophy, and raise up that which is now unhappily allowed to fall down. ... Then nothing should be more sternly laid down than that the inhabitants of your fair city should by all means learn geometry." *The Dialogues of Plato*, trans. B. Jowett, Encyclopaedia Britannica, Chicago, 1996, p. 394.
123. F. Nietzsche, *Eternal Recurrence*, 33. Translation adapted from O. Levy, ed., *The Complete Works of Friedrich Nietzsche*, vol. 16, Foulis, Edinburgh, 1911, p. 253.
124. This theorem is the basis of the recurrence paradox and may be found in any textbook on thermodynamics. For a formal proof of a generalized form of this theorem, and the common errors of physics texts in refuting it, see C. K. Raju, "Thermodynamic time", chp. 4 in: *Time: Towards a Consistent Theory*, Kluwer Academic, 1994. Nietzsche's belief in eternal recurrence came on account of a different generalization of this theorem, to the case of stochastic (Markovian, history-independent) evolution.
125. For a non-technical account, see C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003. A "tilt in the arrow of time" which *increases* with time is a consequence of recurrence which we can observe "here and now". Technically, Newton made a conceptual mistake about time in his physics, making it metaphysical. Correcting that mistake led to special relativity, a little-noticed consequence of which is that the basic equations must be functional differential equations (rather than the ordinary differential equations used by Newton). Dropping "causality" makes these equations of mixed-type, as they are called, and this is just the most general form of physics after relativity.
126. The entire moral doctrine of the post-Augustinian church is denied by preferring the belief in reincarnation (repeated rebirth) over resurrection (rebirth exactly once); see C. K. Raju, "The Curse on 'Cyclic' Time", cited earlier.
127. Augustine, *City of God*, XII.10, pp. 348-49.
128. Andrew D. White, *A History of the Warfare of Science with Theology in Christendom*, D. Appleton and Co., 1897, p. 9.
129. This is the Aetos Kosmou, or the age of the world on the Byzantine Greek calendar in which September 2005 corresponds to the year 7514.
130. Helen S. Lang and A. D. Macro, *On the Eternity of the World (de Aeternitate Mundi) by Proclus*, University of California Press, 2001.
131. This book is arranged like "Euclid's" *Elements* in a series of 211 propositions. Propositions 15 and 16 explain that "anything capable of reversion on itself must be incorporeal and must have an existence separate from the body." Proposition 17 states: "Everything self-moving is capable of reversion on itself," for it "links its end to its beginning". Against this background of "cyclic time" he then argues that anything capable of reversion on itself is self-constituted, hence imperishable and perpetual.
132. Clarence Forbes, "Books for the Burning", cited earlier.
133. Proclus, cited earlier, p. 37.

134. Hilbert's "synthetic" interpretation of the *Elements* is not the only formalisation possible, and a metric interpretation of the *Elements*, as suggested by Birkhoff, is perfectly possible, though it trivialises the *Elements*. Further, Hilbert's interpretation does not fit the entire *Elements*, for proposition I.34 involves the notion of equality in the form of equal and non-congruent areas. To persist beyond I.34 with Hilbert's synthetic interpretation, one would need to define area without defining length, a procedure which is excessively artificial. See C. K. Raju, "How should 'Euclidean' geometry be taught?", paper presented at the International Workshop on History of Science, Implications for Science Education, Homi Bhabha Centre, Tata Institute of Fundamental Research, Bombay, Feb 1999. In Nagarjuna G., ed., *History and Philosophy of Science: Implications for Science Education*, Homi Bhabha Centre, Bombay, 2001, pp. 241–260.
135. As Heath points out, Theon in his commentary refers to his (Theon's) edition of the *Elements* pointing out certain propositions he had proved there. Heath, *Elements*, p. 46.
136. Thomas Heath, *A History of Greek Mathematics*, Dover, New York, 1981, p. 360.
137. e.g. Maria Dzielska, *Hypatia of Alexandria*, Harvard University Press, Cambridge, 1995.
138. Bertrand Russell, *A History of Western Philosophy*, George Allen and Unwin, London, 1947, p. 387.
139. It is noticeable that Proclus' name is associated with *two* books called the *Elements*—his commentary on the *Elements of Geometry*, and a book he authored, called *Elements of Theology*, written in a style similar to the *Elements of Geometry*.
140. C. K. Raju, "The Curse on 'Cyclic' Time", chp. 2 in: *The Eleven Pictures of Time*, Sage, 2003.
141. Just as the accounts of the Lokayata in India focus on their sexual excesses, so also the Mazdakists were accused of invading not only the houses of the nobles, but also their harems: they apparently demanded that not only property, but also women should be shared equally! These aspects of Mazdakism are stressed for we hear these accounts only from sources opposed to Mazdakism: it is obvious that the Zoroastrian clergy responded to Mazdakism in much the same way as the Christian clergy responded, in more recent times, to socialism and communism—they strained every nerve and propagated every possible falsehood, slander, and exaggeration to get rid of it. Apparently, the mildest term used by the clergy for Mazdakists was "accursed"! Indeed, since Mazdakism lingered into the 8th c. and was also regarded by some as a heresy in Islam, there are no accounts of Mazdakism from any sympathetic sources, as happened with the Lokayata in India.
142. We hear of them from only a single Christian source, Agathias, who was commissioned to write a hagiography of Justinian. Agathias names only seven philosophers who chose exile over conversion, and set out for Persia: Diagonos, Hermias, Eulalius, Priscian, Damascius, Isidore, and Simplicius. Gibbon, cited above, vol. 1, chp. 40, p. 670. This passage in Agathias does not tell a credible story. Thus, it is hard to imagine that Justinian, ruler of the mighty Roman empire, was so frightened of only seven recalcitrant philosophers that he needed a law against them. And if the philosophers returned, as Agathias says they did, they seemed to have disappeared like a stone in a pond after their return! Didn't Simplicius' polemic against John Philoponus cause any ripples? If it was Agathias who wrote that passage, he should have had some personal knowledge of that. So, the whole passage seems like the sort of apologia that would have been put in later by some priest in an attempt to tweak history to defend against the criticism

that the philosophers were exiled from the Roman empire. We must remember that priests constitute an army of liars, employed to defend the original lie, so anything they say should not be accepted as true, unless it can be independently corroborated. In this case, the evidence is that philosophical activity continued in Persia.

143. The name Jundishapur derives from the Persian Jund-dez-i Shapur, meaning the military fortress of Shapur. This refers to Shapur I (241–272) who founded the city after defeating the Roman army led by Valerian. Shapur II (310–379) made Jundishapur his capital.
144. Firdausi in his *Shahnama* [*Shahnameh*] discriminates between Burzoe the physician and Bozorgmehr the vazir, while many others conflate the two as this author has done in the past.
145. Firdausi [Ferdowsi], *Shahnameh: The Epic of Kings*, trans. Reuben Lévy, Edition Yassavoli, Tehran, 2006, p. 166.
146. The Ajanta cave 1, a painting from roughly contemporary times, also depicts a Persian mission to a south Indian king.
147. Firdausi, *Shahnameh*, cited above, p. 166.
148. Firdausi, cited earlier, p. 167.
149. Another possible connection to the *Pañcatantra* is that the bull in its main frame story is named Sanjeevaka. Ironically, when the bull is killed the oily jackal Damanaka [Dimna] is victorious, as his name suggests. This is not a Machiavellian ending as some Westerners, and perhaps even Ibn Muqaffa, seem to have read it. It is an indication of what happens to a kingdom when knowledge is not honoured (as happens all too frequently).
150. We hear of this from Ibn Muqaffa's Arabic translation from a couple of centuries later. (M. Inostranzev, *Iranian Influence on Moslem Literature*, Part 1, Echo Library, 2007, pp. 60–61. "I returned from India to my homeland after I had made a copy of this book and a few more.") We have a rough idea of what those books were, and what Burzoe was looking for, for the Pahlavi version of the *Pañcatantra* apparently included three chapters related to *nitiśāstra* from the Mahabharata. ("The Syriac [translation of Būd, ca. 570 CE] as well as the Arabic translations add to the five books of the *Pañcatantra* three chapters from the Mahabharata (XII, 138, 13 ff; 139, 47 ff; 11, 3ff), that too contain *nitiśāstra*-stories", Maurice Winternitz, *History of Indian Literature*, vol. III, Motilal Banarsidass, New Delhi, 1998, p. 334.) The Latin translations replaced the jackals by the narrator, and the text came to be known in Europe as *The Fables of Bidpai* (or sometimes *Fables of Pilpay*), the Bidpai or Pilpay in question being a corrupt form of Vidyapati, the original author (not to be confounded with Vishnu Sharman, a character in the story).
151. According to the market gossip of Baghdad, as stated in the *Fihrist* of al Nadim, the other astrologer was one Mashallah.
152. Here the term *aql*, commonly understood as intelligence or the mental faculty, relates to a *creative* process of inference. This understanding of "reason" (*aql*) is also in contrast to the understanding of deductive inference in the present-day notion of mathematical proof which was conceived by Hilbert as being necessarily of the sort that can, in principle, be checked *mechanically* by a machine which lacks intelligence. This creative understanding of reason is also clear from the fact that the Mu'tazilah grew from the *qadariya*, i.e., those who believed in free will (*ikhtiyar*), suspension of divine will (*lafwid*) or the human ability to create (*qudr*, *kudarat*), as opposed to those who believed in compulsion (*jabr*), i.e., that

- Allah could compel human actions. This belief in human creativity was a natural consequence of their belief in immanence.
153. Incidentally, according to the *Fihrist* of al Nadim, al Jashyari began a collection of Arabic, Iranian, Greek and other tales, but died when he had collected only 480. This suggests that al Nadim was, as may be expected, only putting down the market gossip of Baghdad and not any deeply researched history of a century earlier.
 154. "Thousand and One Nights, The", *Encyclopædia Britannica 2005 Ultimate Reference Suite* CD-ROM.
 155. Richard C. Taylor, "A Critical Analysis of the Kalam fi'l mahd al-khair" in: *Neoplatonism and Islamic Thought*, ed. Parvez Morewedge, New York, 1992, pp. 11–40.
 156. As regards the term "Aristotle", we need to understand the following. From early times, it was the habit of the philosophers to attribute everything to some well-known ancient source. Thus Pythagoreans attributed everything to Pythagoras. Such attributions were only meant to indicate an underlying continuity, and were not intended to be taken literally in the sense in which we today understand someone as an author of a text. This practice continued among Arabs, even until very recent times. For example, a traditional sailing manual from Lakshadweep was recently published (in 1998). The manual was attributed to the most famous of Arab navigators, Ibn Majid, and was in the possession of one Kunhi Kunhi Maestry of Kavaratti island. However, the manual reflects up-to-date information about Indian ports. It has tables from a British sailing manual of 1864. I personally verified that Kunhi Kunhi Maestry had issued this book from the Kavaratti library, and I still retain the issue card. The aim, obviously, was not plagiarism: a navigation manual is something of practical value, that must be as up to date as possible, and was updated by various authors. The reference to Ibn Majid was only meant to establish a lineage, like saying that man descended from Adam. The problem arises because one tries to superpose on another culture the modern idea that a book necessarily has a single author. Although this problem arises for *all* books attributed to Aristotle, Western scholars have admitted this problem only for those books attributed to Aristotle that are thought to be theologically incorrect.
 157. Circumference here means circumference of the local circle of latitude.
 158. Noticeably, the 5th c. Āryabhaṭa uses this circumference with which to give trigonometric values, accurate to the first minute.
 159. By the 8th c., trigonometric values were available accurate to the second (sexagesimal minute). Though our current source for those values is the 9th c. text of Vateṣvara, already before that measurements were made to derive trigonometric values accurate to the thirds. See *Cultural Foundations of Mathematics*, cited above, chp. 3.
 160. Gibbon, vol. 2, chp. 51, p. 299.
 161. Yajurveda, 17.2.
 162. e.g., Daniel 4:10-11: "10 ... I saw, and behold a tree in the midst of the earth, and the height thereof was great." "11 The tree grew, and was strong, and the height thereof reached unto heaven, and the sight thereof to the end of all the earth:" There was nothing universal about the belief in a flat earth. Thus, in contrast, the 5th c. Āryabhaṭa says (*Gola*, 7) that "the globe of the earth is like a Kadamba flower", while the 8th c. Lalla (*Śiṣyadhīrvardhidha*, 20.36) challengingly asks: "If the earth is flat say why can't tall trees be seen by man though at a great distance from the observer?"
 163. Present-day photographs can hardly do justice to the opulence, for a description of which see Gibbon, cited earlier, vol. 2, chp. 51, p. 297.

164. Note that this is not a case of victors writing history, for the Crusaders clearly lost, but are still projected as Christian superheroes, since the church benefited so much in the process.
165. In 1229.
166. Medieval Source Book, <http://www.fordham.edu/halsall/source/cde-jlem.html>. Other sources give similar accounts of how corpses were cut open to search for gold coins. *Robert the Monk's History of the First Crusade*, trans. Carol Sweetenham, Ashgate Publishing, 1998, p. 55.
167. Albert of Aix, "Emico and the Slaughter of the Rhineland Jews", Medieval Source Book, cited above.
168. Medieval Source Book, cited earlier, version of Raymond d'Aguiliers. The version of Fulcher of Chartres says, "Indeed, if you had been there you would have seen our feet colored to our ankles with the blood of the slain. But what more shall I relate? None of them were left alive; neither women nor children were spared."
169. *Encyclopaedia Britannica*, CD 2005, article on Adelard of Bath.
170. For more details, see, Menso Folkerts, *Euclid in Medieval Europe*, the Benjamin Catalogue for History of Science, Winnipeg, 1989. Available online at <http://www.math.ubc.ca/~cass/Euclid/folkerts/folkerts.html>.
171. However, the *Oxford English Dictionary* attributes its origins to the Greek word *alogos*, used in the Xth book attributed to "Euclid", although the early Greeks knew no way to extract square roots. This only goes to show that some books attributed to "Euclid" today involve Arabic-to-Greek translations.
172. Anthony Pym, *Negotiating the Frontier: Translators and Intercultures in Hispanic History*, Jerome Publishing, Manchester, 2000. Sourced from the draft at the website: <http://www.fut.es/~apym/on-line/studies/toledo.html>.
173. "Until recently, historians of the Scientific Revolution of the 16th and 17th centuries treated it as a kind of rebellion against the authority of ancient books and humanist scholarship. In fact, however, it began with the revival of several tremendously important and formidably difficult works of Greek science. The mathematics and astronomy of the Greeks had been known in medieval western Europe only through often imperfect translations, some of them made from Arabic intermediary texts rather than the Greek originals. The papal curia became a center for the recovery of the original Greek manuscripts, often very old and remarkably elegant, and the production of new translations of these works. Ptolemy's 'Geography'—the book which inspired Columbus to attempt his voyage, and remains the model of all systematic atlases—was dedicated to Popes Gregory XII and Alexander V by its first translator, the apostolic secretary Jacopo Angeli." <http://www.loc.gov/exhibits/vatican/math.html>.
174. Gibbon assigns a date of 1100 to this work. Gibbon, vol. II, chp. 42, p. 40 n. 55, p. 608.
175. e.g., Psalm 2:8-9, N.I.V. 28 and 149:6-9, N.I.V. 29.
176. As cited from Las Casas by Robert Francis, "Two kinds of beings: the Doctrine of Discovery and its implications for yesterday and today", web article at <http://www.manataka.org/page94.html>. The original work of Bartolomé de Las Casas, *A Brief Account of the Devastation of the Indies (1542/52)*, can be found in various translations: e.g., *Bartolomé de las Casas—A Short Account of the Destruction of the Indies*, ed. and trans. Nigel Griffin, Penguin, 1992, and Bartolomé de Las Casas, *The Devastation of the Indies: A Brief Account*, trans. Herma Briffault, Johns Hopkins University Press, Baltimore, 1974.

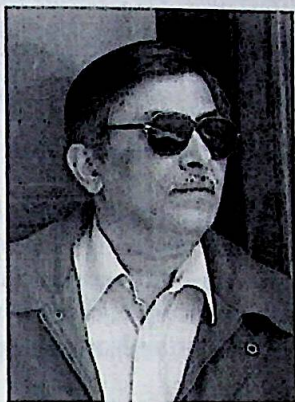
177. Johnson and Graham's *Lessee v McIntosh* 21 U.S. (8 Wheaton) 543, 5 L.Ed. 681 (1823). For a further discussion of this judgment, see Henry Wheaton, *Elements of International Law*, 5th edn., Stevens and Sons, London, 1916, pp. 270-71.
178. For the full story, see Steve Newcombe, "Five hundred years of injustice: the legacy of fifteenth century religious prejudice", web article, based on article with the same title, *Shaman's Drum*, Fall 1992, pp. 18-20. See the website of the Indigenous Law Institute, http://ili.nativeweb.org/sdrm_art.html.
179. Apologists argue that there is no evidence to prove that there was a work-to-death policy in place. But this is like asking for evidence that people in Nazi concentration camps died of bad conditions there. The statistic is evidence enough. The conditions of the slaves have only to be compared to those of the slave owners: did 4 out of 10 Archbishops of Canterbury die within 3 years of assuming office?
180. Eric Williams, *Capitalism and Slavery*, University of Carolina Press, 1944, p. 123.
181. "Between 1799 and 1807, 65 plantations in Jamaica were abandoned, 32 were sold for debts, and suits were pending against 115 others. Debt, disease and death were the only topics of conversation in the island. A parliamentary committee set up in 1807 discovered that the British West Indian planter was producing at a loss.... In 1806 the surplus of sugar in England amounted to six thousand tons. Production had to be curtailed. To restrict production, the slave-trade must be abolished." Williams, *Capitalism and Slavery*, cited earlier, p. 149.
182. Williams, *Capitalism and Slavery*, cited earlier, p. 43.
183. Dale Carnegie, *Lincoln, the Unknown*, Century Co., New York, 1932, p. 182.
184. Williams, *Capitalism and Slavery*, cited earlier, p. 42.
185. Genesis: 9.20-27.
186. Genesis: 10.6 refers to "the sons of Ham: Cush and Mizraim...", Mizraim or Mistr being the word for Egypt, another word being Kemet. There are more explicit accounts in the Rabbinic literature. Today, of course, different "interpretations" are advanced, more convenient for our times; for example, it is said that the curse was meant to last only for four generations.
187. "Of National Characters" (1748), in *The Philosophical Works of David Hume*, Volume III, Thoemmes Press, Bristol, 1996, p. 228. Quoted from E. Morton, "Race and Racism in the Works of David Hume", *Journal of African Philosophy* 1(1), 2002, <http://africanphilosophy.com/vol1.1/morton.html>. Hume revised his wording subsequently, deleting only the clause about all other species of men.
188. Immanuel Kant, "Of National Characteristics, so far as They Depend upon the Distinct Feeling of the Beautiful and Sublime", in *Observations on the Feeling of the Beautiful and the Sublime*, trans. John T. Goldthwait, University of California Press, Berkeley, 1991, pp. 110-1.
189. Emphases original. The original footnote 4 explained: "That the Africans are in a state of savage wretchedness, appears from the most authentic accounts. Such being the fact, an abolition of the slave trade would in truth be precluding them from the first step towards progressive civilization, and consequently of happiness." Boswell goes on to refer to "God's system", adding in footnote 12 that "slavery is acknowledged both in the Old Testament and the New". James Boswell, "No Abolition of Slavery or the Universal Empire of Love: a Poem", London, 1791. <http://www.gutenberg.org/files/20360/20360-h/20360-h.htm>.
190. Thomas Carlyle, "Occasional Discourses on the Negro Question" (later issued as a pamphlet, 1849, "Occasional Discourses on the Nigger Question"), <http://homepage.newschool.edu/het/texts/carlyle/carlodnq.htm>.

191. J. Needham, *The Shorter Science and Civilisation in China*, vol. 2, abridgement by Colin A. Ronan, Cambridge University Press, 1985, p. 42, "Yet although Chinese geometry was essentially tied to the practical needs of measurement, by the thirteenth century some Chinese mathematicians were becoming dissatisfied with mainly empirical methods on which surveying was based."
192. S. P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, Viking, New Delhi, 1997.
193. For more details, see C. K. Raju, *Is Science Western in Origin?*, Multiversity and Citizens International, Penang, 2009.
194. C. K. Raju, *Cultural Foundations of Mathematics: the Nature of Mathematical Proof and the Transmission of the Calculus from India to Europe in the 16th c. CE*, Pearson Longman, 2007.
195. Adelard of Bath, *Dodi Ve-Nechdi*, ed. and trans. H. Gollancz, Oxford University Press, London, 1920, pp. 98–99. Adapted by the author.
196. C. K. Raju, "Benedict's Maledicts", Zmag, <http://zcommunications.org/benedicts-maledicts-by-c-k-raj>. Reprinted in *Indian Journal of Secularism*, 10(3), 2006, pp. 79–90.
197. Al-Ghazali, *Tahafut al-Falasifa*, trans. S. A. Kamali, Philosophical Congress, Lahore, 1958. S. van den Bergh, *Averroes' Tahafut al-Tahafut (incorporating al-Ghazali's Tahafut al-Falasifa)* translated with introduction and notes, 2 vols, Luzac, London, 1969. H. A. Wolfson, *The Philosophy of the Kalam*, Harvard University Press, Cambridge, Mass., 1976.
198. Present-day science has a similar belief in mechanical past causes, and Laplace's demon is exactly such a knowledgeable entity who can, therefore, know the entire past and future. For more details on this issue from the perspective of present-day physics, see C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994, and *The Eleven Pictures of Time*, Sage, 2003.
199. For a more formal description of the chocolate-ice-cream machine, see "Mundane time", chp. 8 in *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994.
200. Formally, as Wittgenstein put it (in *Tractatus Logico Philosophicus*), a "world is all that is the case". That is, a world consists of all propositions declared to be true, and this could model the real world at an instant of time. Present-day philosophy of mathematics and science likewise regards mathematical proof as necessarily true (true in all possible logical worlds), while it regards empirical facts as only contingently true (true in some possible logical worlds). For more details see C. K. Raju, "The Religious Roots of Mathematics", *Theory, Culture & Society* 23(1–2) Jan-March 2006, Spl. issue ed. Mike Featherstone, Couze Venn, Ryan Bishop, and John Phillips, pp. 95–97. Also, C. K. Raju, "Proofs and Refutations in Mathematics and Physics", in *History of Science and Philosophy of Science*, ed. P. K. Sengupta, Pearson Longman, New Delhi, 2012, pp. 273–94.
201. C. K. Raju, "Decolonisation: Time for Change", <http://globalhighered.wordpress.com/2011/09/11/decolonising-our-universities-time-for-change/>
202. The scientific theory here is called quantum field theory. The calculations are done using an infinite series called the S-matrix expansion. There is no proof that the series converges. Indeed, each term of the series involves a divergent integral! See C. K. Raju, "On the square of x^{-n} ", *J. Phys. A: Math. Gen.* 16, 1983, pp. 3739–53, and "Renormalization and Shocks", Appendix to *Cultural Foundations of Mathematics*, cited earlier.
203. For an elaboration, see C. K. Raju, "Proof vs *pramāṇa*", chp. 2 in *Cultural Foundations of Mathematics*, cited above. Also, C. K. Raju, "Proofs and Refutations in

- Mathematics and Physics", in *History of Science and Philosophy of Science*, ed. P. K. Sengupta, Pearson Longman, New Delhi, 2012, pp. 273–94.
204. "That logic has advanced on this sure course, even from the earliest times, is apparent from the fact that, since Aristotle, it has been unable to advance a step and, thus, to all appearances has reached its completion." Immanuel Kant, *Critique of Pure Reason*, preface to the 2nd edn., 1787, trans. J. M. D. Micklejohn, Encyclopedia Britannica, Chicago, 1996 (Great Books of the Western World, vol. 39, Kant), p. 5. If this is what the best Western minds write, what can we expect from the others?
 205. C. K. Raju, "Logic", in *Encyclopedia of Non-Western Science, Technology, and Medicine*, Springer, 2008. Also at: <http://ckraju.net/papers/Non-Western-logic.pdf>.
 206. C. K. Raju, "Quantum mechanical time", chp. 6b in: *Time: Towards a Consistent Theory*, cited earlier. Also, "Probability in Ancient India", *Handbook of the Philosophy of Science*, vol. 7 *Philosophy of Statistics*, ed. Prasanta S. Bandyopadhyay and Malcolm R. Forster. General Editors: Dov M. Gabbay, Paul Thagard and John Woods. Elsevier, 2011, pp. 1175–1196, <http://ckraju.net/papers/Probability-in-Ancient-India.pdf>.
 207. Thomas Aquinas, *Summa Theologica, First part of the Second Part* 91,1. <http://www.newadvent.org/summa/2091.htm>.
 208. <http://www.guardian.co.uk/commentisfree/belief/2009/nov/23/religion-islam>, <http://www.guardian.co.uk/commentisfree/belief/2009/nov/23/religion-islam-science>, <http://www.guardian.co.uk/commentisfree/belief/2009/nov/25/islam-science-muslims-religion>, <http://www.guardian.co.uk/commentisfree/belief/2009/nov/27/islam-science-ghazali>. Also, C. K. Raju, "Islam and Science", *Indian Journal of Secularism* 15(2), 2011, pp. 14–29. <http://ckraju.net/papers/Islam-and-Science.pdf>.
 209. "Cultural Foundations of Mathematics", *Ghadar Jari Hai*, 2(1), 2007, pp. 26–29. <http://ckraju.net/papers/GJH-book-review.pdf>.
 210. Today called rational functions. The sophistication is that such numbers form what would today be called a non-Archimedean field, which has infinities and infinitesimals, and the infinite sums were obtained by discarding infinitesimals. See C. K. Raju, "Teaching Mathematics with a Different Philosophy. 1: Formal mathematics as biased metaphysics", *Science and Culture* 77(7–8), 2011, pp. 275–80. <http://www.scienceandculture-isna.org/July-aug-2011/03%20C%20K%20Raju.pdf>.
 211. René Descartes, *The Geometry*, Book 2, trans. David Eugene and Marcia L. Latham, Encyclopaedia Britannica, Chicago, 1990, p. 544.
 212. Of course, it is absurd to suppose that time itself flows. For Sriharsa's paradox in this regard, imitated by McTaggart, see C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994, chp. 1.
 213. C. K. Raju, "Time: What is it That it can be Measured?", *Science & Education*, 15(6), 2006, pp. 537–551. http://ckraju.net/papers/ckr_pendu_1paper.pdf.
 214. C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994, chp. 3b.
 215. C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003.
 216. S. W. Hawking and G. F. R. Ellis, *The Large Scale Structure of Spacetime*, Cambridge University Press, 1973, p. 364.
 217. For a popular account, see *The Eleven Pictures of Time*, cited earlier. For a more technical account, see "Renormalization and shocks", appendix to *Cultural Foundations of Mathematics*, cited earlier. For an account from within formal mathematics, from the days when I still believed in it, see "Distributional matter tensors in

- relativity", in *Proceedings of the Fifth Marcel Grossmann meeting*, D. Blair and M. J. Buckingham (ed.), R. Ruffini (series ed.), World Scientific, Singapore, 1989, pp. 421–23. [arXiv.org:0804.1998](http://arxiv.org/0804.1998).
218. F. J. Tipler, *The Physics of Immortality: Modern Cosmology, God and the Resurrection of the Dead*, Macmillan, London, 1995, preface.
 219. We have already seen some of Newton's mistakes, e.g., his belief in divine laws of nature, and his belief in the perfection of mathematics, which led to the mistake in his physics. As for Nietzsche, he opposed the church by using the notion of supercyclic time or what he called "the eternal recurrence of the same". In this he fell a victim to Augustine's trap, used to establish post-Nicene theology or the first alteration of Christianity, which changed the Christian notion of soul. Augustine's argument against Origen set up an implicit dichotomy between two notions of time: linear and cyclic. This belief still persists in the myth of the eternal return propagated by Mircea Eliade and a variety of Western-miseducated people who still believe that there are only two pictures of time: linear and cyclic. It was to bust this myth, on which post-Nicene theology is founded, that I wrote *The Eleven Pictures of Time*, Sage, 2003.
 220. For example, the Yuktiḥāṣā. For further details, see C. K. Raju, "Computers, mathematics education, and the alternative epistemology of the calculus in the Yuktiḥāṣā", *Philosophy East and West*, 51(3), 2001, pp. 325–62. Available online at <http://ckraju.net/papers/Hawaii.pdf>.
 221. *Gaṇita* 13. K. S. Shukla and K. V. Sarma, *Āryabhaṭṭya of Āryabhaṭa*, Indian National Science Academy, New Delhi, 1976.
 222. Another related objection is that geometry, Western philosophers say, ought to be concerned solely with the motionless properties of space, so that proofs should not involve motion in space. Today, they offer the doubt that space might be "bumpy" so that moving things about in space might deform them like a shadow moving over bumpy ground gets deformed.
 223. Immanuel Kant, *The Critique of Pure Reason*, trans. J. M. D. Meiklejohn, Chicago, Encyclopaedia Britannica, 1990, p. 31.
 224. For Buddhist logic, see the article on "Logic", cited earlier. For quantum logic, see C. K. Raju, "Quantum mechanical time", chp. 6b in *Time: Towards a Consistent Theory*, cited earlier. Available online at <http://arxiv.org/pdf/0808.1344v1>. For the connection between the two, via quantum probabilities, see C. K. Raju, "Probability in Ancient India", *Handbook of the Philosophy of Science*, vol 7. *Philosophy of Statistics*, ed. Prasanta S. Bandyopadhyay and Malcolm R. Forster. General Editors: Dov M. Gabbay, Paul Thagard and John Woods. Elsevier, 2011, pp. 1175–1196. Available online at <http://ckraju.net.papers/Probability-in-Ancient-India.pdf>.
 225. B. Russell, "The Teaching of Euclid", *The Mathematical Gazette* 2(33), 1902, pp. 165–167. Available online at http://www.gap-system.org/~history/Extras/Russell_Euclid.html.
 226. David Hilbert, *The Foundations of Geometry*, trans. E. J. Townsend, Open Court, Chicago, 1902. Bertrand Russell, *An Essay on the Foundations of Geometry* [1897, 1908], Routledge, London, 1996.
 227. B. Russell, "Mathematics and the Metaphysician", in *Mysticism and Logic*, 1917, chp. 5, p. 75; available online.
 228. School Mathematics Study Group, *Geometry*, Yale University Press, 1961.
 229. Healing was similarly disconnected from the soul, and medicine reinterpreted in instrumental terms.
 230. C. K. Raju, "Probability in ancient India", cited earlier.

About the author



Professor C. K. Raju started off conventionally as a formal mathematician. After an MSc from the Centre of Advanced Study in Mathematics, Mumbai, followed by a PhD from the Indian Statistical Institute, Kolkata, he taught mathematics at Pune University for several years. He researched in functional analysis and its applications to mathematical physics, especially infinities in general relativity and quantum field theory. Later, he played a key role in building India's first supercomputer, Param.

In *Cultural Foundations of Mathematics* (Pearson Longman, 2007) he established that calculus developed in India, and was transmitted to Europe where it was poorly understood just because Europeans mixed math with religion. Those difficulties with calculus led to Newton's error about time in physics. In *Time: Towards a Consistent Theory* (Kluwer Academic, 1994), and *The Eleven Pictures of Time* (Sage, 2003), he had earlier explained how correcting that error about time leads to a reformulation of physics using functional differential equations. He was awarded a gold medal in 2010, in Hungary, for correcting Einstein's related mathematical mistake.

While visiting the School of Mathematical Sciences of the Universiti Sains Malaysia he taught calculus, in three countries, with a different philosophy called zeroism. This demonstrated that math becomes easy if delinked from Western theology. He was an editor of the *Journal of Indian Council of Philosophical Research*. His popular books include *Is Science Western in Origin?* (Multiversity, 2009).

Some reviews of C. K. Raju's earlier books

Time: Towards a Consistent Theory (Kluwer Academic, 1994)

"an important contribution... authoritative and written with impeccable clarity... an excellent book and I highly recommend it."

G. J. Klir

Int. J. General Systems, 27, 1999, pp. 427-28

"Raju's treatment of the subject is comprehensive.... The bare concept that I have just summarised is exploited with subtlety and elegance by Raju... Raju writes with ease and deft wit... The book is too rich and robust to admit a simple, comprehensive synopsis... an important book that you will certainly want to read..."

J. F. Woodward

Foundations of Physics, 26, 1996, pp. 1725-1730

"The powerful literary style on the one hand, and a firm control on the mathematical language of quantum logic... form a rare blend of complementary qualities not often noticeable in a serious treatise on a physical subject. Altogether it is a delightful book with a high degree of intuitive appeal.

A. N. Mitra

The Eleven Pictures of Time (Sage, 2003)

"... magnificent, a true magnum opus... a tremendously important piece of work. ... This, in my view, is a truly revolutionary book (not merely an excellent book)....

Arun Ghosh

"With masterly command of primary sources and a delightful sense of wit and humour, C. K. Raju traces the history of the notions of time... Is scientific theory then 'context' and value free, is the key question which is asked by a scientist with rare courage and boldness.... Perhaps never before have these dimensions been brought to the fore with such incisive sharpness. Brilliant, thought provoking and singular..."

Kapila Vatsyayana

Sandhan, 4(2), 2004, pp. 179-85

"This is a book with a difference, and the difference will excite some readers, as it did me, and infuriate many others. Central to Raju's perspective is the obvious yet neglected idea that the notion of time is fundamental to both religion and science, each of which has influenced the other... I want to compliment and thank C. K. Raju for what he has done in this important book. Future debate ought begin here."

Don Miller

Time and Society, 13(2), 2004, pp. 405–407

Cultural Foundations of Mathematics (Pearson Longman, 2007)

"I enjoyed very much the book... proof in the western mathematical tradition is dealt with remarkable originality by C. K. Raju. ... a treatment which is both didactical and rigorous. I have no hesitation at all in placing this book among the best treatments of the history and philosophy of mathematics."

Ubiratan D'Ambrosio

"It has been common understanding that mathematical proof based on deduction is universal and is the ultimate proof and also that mathematical truths are eternal/universal truths. C. K. Raju argues that this is a narrow European view of mathematics and the Indian view was very different and empirical. Thus he has raised the important issue of cultural foundation of mathematics."

Ghadar Jari Hai, 2(1), 2007, pp. 26–29

"This book brings new facts on the history of mathematics and science that if carried to its logical conclusions should transform our Eurocentric perceptions. The author C. K. Raju comes to this task with an impeccable hands-on knowledge of science and technology. He was a leading figure in the first supercomputer put together in India at a time when the US banned supercomputer exports to India..."

Susantha Goonatilake

Sandhan 7(1), 2008, pp. 181–85

Is Science Western in Origin?
(Multiversity and Citizens International, 2009)

"Raju makes mincemeat of the received view of the Greek origins of science."

Vinay Lal

"an excellent monograph... by Prof. C. K. Raju... though small in length, [it] is much larger in significance... It is highly learned in its contents..."

Asghar Ali Engineer

Islam and Modern Age, Dec 2009

"C. K. Raju has been arguing passionately through several lectures and books... He says what is taught as standard modern mathematics today, is based on theological positions taken by the Church after the Crusades."

Shivanand Kanavi

Ghadar Jari Hai, 3(3&4), 2009, pp. 8-11

"both path-breaking and definitive."

Martin Bernal

Euclid is celebrated as the father of geometry, and author of the *Elements*, a book once revered like the Bible, but now a school text. Strangely, Greek manuscripts do not mention Euclid, but speak anonymously of the “author of the *Elements*”. Did Euclid exist? Was the real author of the *Elements* a woman, Hypatia? Was she black?

The mystery geometry of black Egypt aimed to arouse the soul, and prove equity, as in Plato's story of Socrates and the slave boy. Early Christians had similar beliefs about the soul, but the church changed Christian doctrine to enable its priests to rule. When “pagans” resisted, the church retaliated violently: it smashed their temples, burnt their libraries, cursed the early beliefs about the soul, and banned philosophy. This plunged Christendom into its Dark Age, but catalysed the Islamic Golden Age. The contrast fuelled envy, and Christian priests incited the Crusades, hoping to grab Muslim wealth—but the Crusades failed beyond Spain. To convert Muslims, who accepted reason, the church now sought mathematics, connecting it to Christian doctrine by changing both.

That led to a subtle religious bias in mathematics, and to its racist history. This book is for the layperson concerned that both biases are still being thrust upon schoolchildren today.

Praise for C. K. Raju's earlier books

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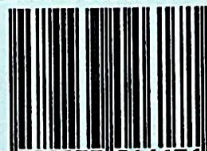
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